INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Volume 19 JULY, 1930 Number 7

Objectives of the Industrial Arts in Junior and Senior High Schools

*Carter V. Good**

WHAT are the objectives of the industrial-arts curriculum in the American secondary school? What courses or subjects are offered in secondary industrial-arts curricula? To what extent are these courses constants or electives for the high-school pupil? These are questions in which teachers of industrial arts, supervisors, principals, superintendents, school-board members, and employers may well be interested. It is not out of place to suggest that pupils and parents also are vitally interested in such matters.

As a part of a larger investigation begun early in 1927, the writer attempted to answer these questions specifically for the industrial-arts curriculum. High-school manuals and programs of study were requested of the various state departments of education and of the five largest cities in each state. The relatively large number of manuals and courses of study received were analyzed in an attempt to answer, at least in part, the questions raised in the first paragraph of this report.

The aims of industrial education were tabulated as nearly as possible in the terminology of the manual or course of study from which they were taken. Such a procedure serves to preserve the original meaning and makes possible a comparison of the terminology used by different school officials in stating objectives. The objectives are tabulated according to frequency of mention, running from highest to lowest frequency. The list of objectives follows:

Objectives of Industrial Arts	*Frequency*
1. A thorough knowledge of industrial processes and materials	12
2. Opportunity to explore aptitudes	7
3. Manipulative skill	5
4. Embody a more strictly vocational trend for broader life view	4
5. Ability to do repair jobs around home	3
6. Overcome isolation existing between school and life	3
7. Teach creative interests and develop creative powers	3
8. Vocational guidance	3
9. Bridge gulf between thinking and doing	2
10. Confidence in ability to meet difficult situations in industrial matters	2
11. Develop habits of accuracy	2
12. Give knowledge and experience for emergencies	2
13. Train for appreciation of all life's activities and development of good citizenship	2
14. Touch life of boy in work, play, school, and home	2
15. Vocational preparation	2
16. Correlation with other school subjects	1
17. Develop initiative and self-reliance	1
18. Develop breadth of experience and appreciation	1
19. Develop minor executives for industrial positions	1
20. Insure natural and healthy growth and development of youth	1
21. Show importance of definite plan and orderly procedure	1
22. Lay right foundation for all forms of all productive and creative work	1
23. Raise standard of living	1
24. Give training with an economic value	1
25. To develop muscular control for ordinary muscular tasks	1
26. Teach fundamental tool processes of carpentry	1
27. Teach methods of frame building construction	1
28. Worthy home membership	1

An examination of the list of objectives indicates that general values, such as a thorough knowledge of industrial processes and materials, exploration of aptitudes, and manipulative skill, are emphasized in the schools represented rather than the more limited vocational objectives. Such a line of emphasis is in keeping with the general purpose of the American secondary school which is designed primarily to provide the best general education possible for the adolescent. Doubtless the industrial-arts curriculum may well seek to give to the adolescent an understanding of industrial processes, materials, relationships, and trends, rather than to provide specific training in a narrowly limited vocation or industrial process. However, it must be recognized that not all pupils can complete high school, but must go into industry at an early age; probably for such individuals more attention must be given to specific vocational objectives, although such pupils, more than those who remain to graduate, need the

*Professor of Education, Miami University, Oxford, Ohio.

general values emphasized in the list of objectives.

It does not follow that the list of objectives as tabulated in this report is complete or is specific and detailed enough for the various subdivisions of industrial arts. Nor is there evidence to show conclusively that school systems follow definitely the aims or objectives printed in a high-school manual or program of study. However, the fact that school officials have seen fit to include in their programs of study the aims tabulated indicates present tendencies and current lines of emphasis in industrial-arts education. The schools represented are typical of the American secondary-school system and are distributed over a wide geographical area.

Tryon, Smith, and Rood[1] report a very interesting study of the junior-high-school curriculum. In Table I are summarized the results of their analysis of the industrial-arts curriculum. The data in this table shows that 68 of the 78 junior-high-school centers in the seventh grade, and 60 in the eighth grade require all boys to take some work in industrial arts. Only 9 of the 78 centers require all boys to pursue industrial-arts work in the ninth grade. This practice seems in keeping with the idea that the ninth grade is the point at which the pupil selects a special curriculum according to his individual interest. To prescribe industrial-arts work for all pupils at this point and beyond would interfere decidedly with the pursuit of individual interests and the development of special capacities.

It will be noted that most of the courses tabulated in Table I appear under the headings of "industrial arts" and "practical arts." This is not the practice in the senior high school where a large number of specialized courses are offered as electives or as a part of the industrial-arts curricula.

Table II summarizes the results of the writer's analysis of the industrial-arts curriculum in thirty senior high schools. Since data were available for the ninth grade, they were included in the tabulation for purposes of comparison. The course titles are tabulated exactly as listed in the courses of study and are arranged alphabetically. In Table II the figures opposite the general heading or subject group represent totals for the subdivisions under "industrial arts." A constant is interpreted as a subject required of all pupils. A variable or elective is a course not required of all pupils or not common to the various curricula offered.

An examination of Table II indicates that without exception industrial arts is an elective in the senior high school. It is evident that some form of industrial-arts work is offered in most of the schools represented; many schools provide a wide variety of offerings in this field. Attention may be called to the diversity of titles in use in industrial-arts education, although this is a condition not peculiar to work in industrial arts. The casual observer is not able to determine how much overlapping and similarity of content there are in such courses as advanced shop, advanced woodworking, benchwork, cabinetmaking, cabinetwork, carpentry, general shop, joinery, machine woodworking, manual arts, manual training, practical arts, shop, shopwork, woodshop, woodworking, and wood turning. If it is merely a difference in terminology applied by different schools to subject matter alike in many respects, then some general agreement might well be reached with regard to a common title for the given body of subject matter. If there is a common body of subject matter involved in these courses, which it is assumed are concerned with some form of woodwork, that

[1] R. M. Tryon, H. L. Smith, and Allan F. Rood, "The Program of Studies in Seventy-Eight Junior High School Centers," *School Review*, XXXV (February, 1927), pp. 96–107.

TABLE I

INDUSTRIAL-ARTS COURSES OFFERED IN SEVENTY-EIGHT JUNIOR HIGH SCHOOL CENTERS

Course	7th Grade		8th Grade		9th Grade	
	Constant	Variable	Constant	Variable	Constant	Variable
INDUSTRIAL ARTS*	68	16	60	36	9	65
Practical Arts**	12	3	15	5	3	7
Industrial Arts	50	6	19	19	2	28
Woodworking	1	4	0	3	0	9
Mechanical Drawing	3	3	5	8	2	26
General Shop	5	0	8	6	1	2
Agriculture	0	1	2	1	0	7
Vocational Agriculture	0	0	0	0	0	1
Broadening and finding Course	1	0	1	0	0	0
Manual Training	0	2	15	0	2	19
Machine Shop	0	0	1	0	0	3
Sheet Metal	0	1	1	3	0	1
Electricity	0	2	2	2	0	3
Printing	0	2	0	6	0	13
Wood Turning	0	1	0	0	0	0
Forge	0	1	0	0	0	0
Auto Mechanics	0	0	0	1	0	4
Plumbing	0	0	0	1	0	0
Metal Work	0	0	0	1	0	0
Carpenter Shop	0	0	0	0	0	1
Patternmaking	0	0	0	0	0	1

*The figures opposite the general heading or subject group, "Industrial Arts," do not represent totals of the subdivisions, since a given school may offer more than one type of industrial-arts work and therefore be represented more than once in the tabulation.

**In some instances includes home-economics work.

TABLE II

INDUSTRIAL ARTS COURSES OFFERED IN THIRTY SENIOR HIGH SCHOOLS

Course	9th Grade		10th Grade		11th Grade		12th Grade	
	Constant	Variable	Constant	Variable	Constant	Variable	Constant	Variable
INDUSTRIAL ARTS	0	79	0	86	0	71	0	60
Advanced Shop	0	0	0	0	0	0	0	1
Advanced Woodworking	0	0	0	0	0	1	0	1
Applied Arts	0	0	0	0	0	0	0	1
Applied Electricity	0	0	0	0	0	2	0	0
Applied Mechanics	0	0	0	0	0	1	0	0
Apprenticeship	0	0	0	1	0	1	0	1
Architectural Drawing	0	1	0	2	0	1	0	1
Art Metal	0	0	0	2	0	0	0	0
Auto Mechanics	0	1	0	1	0	1	0	3
Auto Repair	0	0	0	1	0	1	0	0
Benchwork	0	2	0	0	0	0	0	0
Boatbuilding	0	1	0	1	0	0	0	0
Boat Drawing	0	1	0	0	0	0	0	0
Cabinetmaking	0	2	0	2	0	2	0	1
Cabinetwork	0	1	0	1	0	0	0	0
Carpentry	0	0	0	0	0	0	0	1
Drafting	0	0	0	0	0	1	0	0
Electrical Work	0	1	0	0	0	0	0	0
Electricity	0	4	0	1	0	1	0	2
Elem. Mechanical Drawing	0	1	0	0	0	0	0	0
Forge Shop	0	0	0	1	0	1	0	1
Forge Work	0	0	0	0	0	2	0	0
Foundry	0	0	0	1	0	1	0	1
General Metal	0	1	0	0	0	0	0	0
General Shop	0	1	0	1	0	0	0	0
Joinery	0	2	0	1	0	0	0	0
Lathe	0	0	0	1	0	0	0	0
Leather and Bookbinding	0	0	0	1	0	0	0	0
Machine Drawing	0	1	0	1	0	0	0	1
Machine Shop	0	1	0	3	0	3	0	4
Machine Woodworking	0	1	0	0	0	0	0	0
Machine Work	0	0	0	0	0	1	0	0
Manual Arts	0	3	0	3	0	2	0	1
Manual Training	0	11	0	8	0	6	0	5
Mechanical Drawing	0	18	0	24	0	17	0	15
Metal Work	0	1	0	1	0	2	0	3
Molding	0	0	0	1	0	0	0	0
Patternmaking	0	0	0	2	0	0	0	1
Practical Arts	0	2	0	2	0	1	0	2
Printing	0	7	0	5	0	6	0	4
Radio	0	1	0	1	0	3	0	1
Sheet-Metal Drafting	0	1	0	0	0	0	0	0
Sheet-Metal Work	0	2	0	1	0	2	0	1
Shop	0	1	0	2	0	3	0	2
Shop Vocational	0	1	0	1	0	0	0	1
Shopwork	0	1	0	1	0	1	0	1
Smithing	0	0	0	1	0	0	0	0
Telegraphy	0	1	0	1	0	1	0	0
Trade Technology	0	0	0	1	0	1	0	1
Wood Block	0	0	0	1	0	0	0	0
Woodshop	0	1	0	0	0	0	0	0
Wood Turning	0	1	0	2	0	1	0	0
Wood Turning	0	0	0	1	0	1	0	0
Woodworking	0	5	0	5	0	4	0	3

could be organized and grouped under three or four titles, certainly the terminology of industrial-arts education would be clarified greatly.

Other relatively new curricula in the secondary school have the same diversity of terminology; namely, home economics and the social studies. The junior high school itself is in a transition period in which its terminology has not become crystallized and uniform. The writer has pointed out at other times that for a number of the high-school divisions of subject matter, including industrial arts, standardization of terminology would benefit pupils who transfer from one school to another, college officials who have charge of admissions, employers of high-school graduates, and the workers in the secondary field who write and speak about the curricula.

Vocational Work in a Cosmopolitan High School

*George M. Brace**

WE frequently hear from convention platforms, statements similar to the following:

"High-school machine-shop work cannot be successfully carried on in 45-minute periods."

"Vocational production work cannot be carried on in the cosmopolitan high school."

Sometimes we find men so bold as to dispute these statements, others are timid and rather than subject themselves to a barrage of embarrassing questions and remarks, they allow the statements to go unchallenged.

The accompanying illustrations show photographs that were taken at Central High School, St. Paul, Minnesota, at the close of the first semester, 1930.

The teachers of two of these shops have been doing production work of this kind for several years, while the third is making plans to put the production system into effect soon.

The machine-shop project is a small woodworking lathe about 3½ ft. long. Over 100 of these lathes have been made and it takes an expert mechanic to pick out the best ones. The class is divided into groups and a foreman placed in charge of each group. These foremen are selected because of their experience in machine-shop work, and their ability to instruct and supervise. One is surprised at the seriousness with which the foremen assume their responsibilities, and the energy they exhibit in getting good work done on time. Each boy repeats various operations frequently enough to develop considerable skill in handling power machines, for the work must pass a rigid inspection by the foreman who is responsible to the instructor who makes the final inspection. Some of the advantages of this system of shopwork given by the instructors, are as follows: Economical of time; possess vocational-guidance values; fewer projects for the teacher to supervise; a larger number of pupils can be accommodated; work can be organized better; safety in operating machines can be more easily supervised; it provides training in leadership; it fosters teamwork; discipline questions disappear; each pupil at the end of the semester has a finished product; the slow, inexpert boy is put on simple operations and so is not put in competition with his more expert classmate; it decreases time wasted in loafing.

*Director of Manual Training, Department of Education, St. Paul, Minn.

FIG. 1. Elementary Cabinetmaking, L. H. Hamsberger, Instructor.
FIG. 2. Machine Shop, R. D. Berg, Instructor.
FIG. 3. Cabinetmaking, A. F. Schwabe, Instructor.
The work shown above was done by the students of Central High School, St. Paul, Minnesota, during 1 term, working 45 minutes per day, 5 days per week.

The methods used in the school shops are the same as those used in manufacturing plants, and time wasted in setting up machinery for a variety of operations by one pupil is saved for demonstrations and class talks by the instructor.

In the advanced cabinetmaking shop the classes have finished about 50 mahogany end tables, some of which are shown in the illustrations. These tables have been routed through the shop on the production basis, and all of the advantages mentioned in the foregoing pertain to this shop also.

The projects attempted vary from year to year; so far the following have been made: Gasoline engine, emery grinder, jig saw, lathe, brass candlesticks, card tables, bridge lamps, and tables, davenport tables, chairs, and vises.

Economy of Time

It is very doubtful whether any teacher could get classes to finish so large a number of projects like those illustrated, if they were working on the basis of each individual making a complete project in the time specified.

It would be very difficult for any instructor to time his talks on related information or give demonstrations which would be equally valuable to all pupils if each was concerned with making his own lathe or table. The variation in student abilities, the difficulty in furnishing machines just when needed, and the time consumed in setting up machines for each individual only to reset it for a different operation for the next boy, all make it nearly impossible to keep the class together so that each individual can profit from the demonstrations and talks.

With a 45-minute period at his disposal, the teacher must necessarily develop schemes whereby a saving of time results.

Fewer Projects to Supervise

Many woodworking instructors allow the individual student to choose what piece of furniture he wishes to make, or at least a choice of several groups of designs, is permitted. It is thought that interest is best conserved by this method. But if an instructor conducts several conferences with his pupils and gets their reaction after discussions of usefulness, difficulties, costs, etc., have been held, and after various designs have been studied, then the vote is usually so overwhelmingly in favor of one design that very little, if any, dissatisfaction results. The shop, machines, tools and pupils may be organized for the routing of one project with the least amount of time wasted, and the instructor can work out his instructions and directions much more carefully.

Larger Number of Pupils Accommodated

Under this system, a larger class can be accommodated because all machine tools are occupied all of the time, which is not the case when pupils select individual projects.

There also is a saving of equipment in the fact that a number of the older and more experienced boys are acting as foremen, learning how to handle men, how to give instructions, how to route work, how to conserve material, how to discover varying abilities. This foreman training is valuable and not usually provided for in a cosmopolitan high school.

Greater Safety in Operating Machines

When one boy operates a machine in producing fifty or more parts of a project, he becomes more expert and more careful because he understands the operations and the necessary precautions more thoroughly than when fifty boys each make only one part. There may be one or two safety precautions pointed out to him when he undertakes production operations; when he is shifted to another production job the same precautions are brought to his attention. The boy making an individual piece and performing all of the machine operations in turn is apt to forget or get confused in trying to remember the safety precautions given him for all machines and tools at one time.

Development of Teamwork

When a pupil is assigned to a definite operation involving the construction of a unit which must match other units when the project is assembled, he is apt to feel a certain amount of responsibility for teamwork to the extent that all of his pieces or units must be made so carefully as to be interchangeable; if he falls down in accuracy or speed, he naturally affects other workers all along the line. Individual responsibility for the proper completion and assembling of the project is developed to a high degree.

Disciplinary Results

The question of discipline does not appear to any great extent in production work because each foreman must keep his gang working at top speed in order to do his share of teamwork; the boys are rated on accuracy and speed, so if marks mean anything to them (and they usually do) there is no incentive to loaf or otherwise waste valuable time.

A Finished Product

When the old system of individual production was in use, a number of slow pupils always failed to complete their project, or their work would be unsatisfactory. Under the present system pupils are assigned to jobs according to their ability, the more difficult jobs are assigned to the more expert workmen; at the end of the semester each boy receives a completed project which represents the combined abilities of the various members of the entire class, consequently the product is uniformly better.

Vocational Guidance

The opportunities for vocational guidance in these production classes are rather unusual because of the commercial-shop atmosphere and environment, they find conditions in these classes similar to those in the outside world and therefore their decisions to follow or not to follow the trade represented are based on rather sound and adequate exploratory experiences. In addition to the skill and technical knowledge gained, the economic, social and ethical content of the trades are not neglected, and are apt to carry conviction.

One gets a real thrill entering a shop where this work is carried on in this manner because of the attitude of the pupils toward their work, the absolute lack of loafing and visiting, the information, advice and criticism being offered by the foremen.

The interest in the work is exemplified by the fact that each semester there is a waiting list of students who want to take up this kind of work. This work has

been carried on for a number of years and we are satisfied that it is possible to accomplish satisfactory results in one semester, five days per week, 45 minutes per day. Of course, the teacher must be capable of organizing the program so there will be no lost motion, and he must be willing to put in the required time in planning his work. He also must be able to get coöperation from drafting-room teachers and patternmaking classes in order to get required drawings and castings at the time they are needed. However, success in any kind of work depends on the teacher and no system will produce good results unless the instructor is capable.

The Special Child in Our Scheme of General Education

*Towne R. Abercrombie**

WHILE much has been said for the benefit of the regular, normal child in our public schools through the medium of magazines and books, there seems to be entirely too little attention paid to the problem of the *special child*, or the *special class*, speaking especially from the industrial-arts viewpoint. The problem exists, however, especially in our larger school systems, and the industrial-arts departments of our schools can do an untold amount of good in the betterment of conditions for the unfortunate child who is placed in the school system under the category of *special*.

The industrial-arts field is making rapid and wonderful strides in the general scheme of education. It is reaching out and exploring fields heretofore considered outside the sphere of the school system. It is not only exploring but actually bringing into the general scheme of the education of the children of today and tomorrow, concrete, specific phases of the real life, which the pupil must face when he leaves the school system.

This is a wonderful age in which we are now living, and each day brings forth new things at which we marvel. The school, if it is to keep up with the wonderful developments of today must necessarily be ever on the alert and must do all that is possible to provide the child with a background which is both practical and sound. Each day we discover new methods of manufacturing which require less and less of man power. Each day new schemes of efficiency are inaugurated which require fewer hands. Each day we find practically all fields becoming more and more specific and requiring the services of skilled hands and alert minds. It is a real problem for the schools to prepare the normal child for the task of facing life, but what are we doing for the poor, unfortunate, so-called special that will fit him, with his handicap, to make a living and become at least a self-supporting member of society. It must be admitted that great strides have been taken in this field, but much remains to be done, and the industrial-arts departments of our public schools can do much to further this phase of general education.

Before making any attempt, however, to advance suggestions for the betterment of the type of child referred to, it will be well to determine what constitutes a special child, or a special class, for we may assume that the development of any program will be done not with individuals alone, but with groups of individuals in classes. There may be many and diversified reasons for placing a group of children in a special class. This segregation, however, is usually the result of the failure on the part of a child, or group of children to profit to the fullest extent from the instruction given the normal child in the average classroom, or there may be children who are otherwise educationally or personally maladjusted in school and who, for that reason, are assembled in smaller groups for purposes of instruction particularly adapted to their individual needs.

In our larger school systems there are many types of special classes, among which we find classes for sight saving, restoration classes, open-air and health classes, classes for incorrigibles or predelinquent children, classes for the children of superior ability and intellect, classes for the mentally subnormal, and many others. It would be possible to develop a successful program for each of these types of classes, but this could only be undertaken in the larger school systems. The smaller school, while it has its percentage of cases which would fall into one of the several types of the special classes, has not sufficient equipment or money with which to begin the development of a thorough program. Some factors of such a program would be suitable for all types, but it is especially with children who are not mentally normal in every respect, that this article will deal.

It is true in the shops, as well as in the regular classroom, that the retarded child, no matter what the cause for the retardation, will always be a constant source of worry to the teacher if it is placed in a normal class. Being unable to grasp even the fundamentals of instruction as rapidly as the normal child, the subnormal child becomes practically a dead weight as far as group instruction is concerned and must necessarily be given individual instruction if it is to be kept anywhere within the reach of the normal group. A natural result of this system is that whereas the normal child would profit greatly from the individual attention, the retarded child will profit but little. This statement may be criticized but in the opinion of the writer it is based on fact and experience.

It is also true that if a group of children are placed together for instruction without having first been classified as to their abilities and capacities, there will be found some who are particularly hard to classify in either the normal group, or the retarded group. Several factors may contribute to such a condition,

*Instructor of Woodworking, Washington Junior High School, Cincinnati, Ohio.

among which might be mentioned illness which might temporarily place the child in a retarded state; or absence for other reasons which would also contribute to a similar condition. For the most part, however, the border-line child has some particular little quirk somewhere in his mental makeup, which, if discovered and remedied, would place him in the normal group. This fact, however, remains, that if the teacher must devote a great deal of time to individual instruction of the really retarded pupils, the border-line pupil, who is so sadly in need of the individual assistance of the teacher, will continue in the border-line group, and may possibly be classified as a really retarded pupil. If the class is freed of the retarded pupil, however, and the time spent in individually assisting the border-line child, the result will be that the child will most probably be carried over the barrier and into the group of normals.

The Special Class in Academic Subjects

Perhaps a concrete example would clarify the foregoing statements. In one of the public schools of our city, the teachers of a particular boy had for years despaired of his ability to read. He was classified as retarded, and was placed in a special class. Thanks to the never-failing interest and enthusiasm of the teacher of this class, the reason for his failure to read was discovered. He had never found anything that interested him, and therefore had made no effort to apply himself. The teacher, knowing that the boy and his dog were almost inseparable, made use of this love for his dog as an incentive and interested him in stories about other boys and their dogs. It was but a short time before the boy took a liking for other stories, and the result was that he was again placed in a normal group, and became an interested, active member of his class. Had he been left to his own resources, or allowed to remain in the regular classroom where he could only be a drag, the chances are that he still would be considered as slightly mentally deficient.

This same teacher was successful in returning a girl who allegedly could not learn the so-called fundamentals of mathematics, back into the classes with the normal children. The girl, shortly after entering the special class, was absent from school for some time. The teacher visited the child's home and discovered that both parents were ill and therefore unable to care for the little business which they conducted as a means of livelihood. The girl was tending shop, made all the purchases from the wholesale houses, and was keeping a very accurate set of books. She had constant contact with mathematics that might have puzzled even some of her teachers, yet in the category of the school she was considered as being "special." Upon her return to school, her actual everyday experience along the line of mathematics was utilized, and, as she was on familiar ground she soon developed a keen interest in the subject and was soon far enough advanced to resume her position in the normal class.

The Special Class in Shopwork

The special class in the shops, as well as in the regular classroom should, as far as possible, consist of pupils of nearly equal intelligence so that the shop teacher will be able to provide a very definite program suited to the needs of the individuals. If, however, it is not possible to divide the pupils into classes which will provide the proper grouping, it is possible to subdivide the class into different groups and thus provide suitable programs. Thus, the really retarded members of a class may be classified and a program established for them, the border-line pupils may be also grouped and their needs very carefully analyzed. By no means, if results are hoped for, should the latter group receive the same type of instruction as the former, for the teacher will find that he is dealing with two entirely different types. Careful distinctions must be made and complete psychological studies made of the individual child with due respect given to the mental factors of conduct, learning, skill, personal traits, etc., and the grouping should be done in accordance with these findings.

Let us take one school as an example. In this particular school there are three so-called special classes. One of these classes consists of pupils who are classified as being decidedly subnormal, and from this class six boys are permitted to take shopwork in the hope that this particular phase of activity may be the means of discovering some latent power or possibility which otherwise might not make its appearance. This group was carefully selected and tested before being placed in the group, as will be noted by a study of the I.Q.'s of the different individuals. Boy A, I.Q. 68; Boy B, I.Q. 71; Boy C, I.Q. 58; Boy D, I.Q. 54; Boy E, I.Q. 64; Boy F, I.Q. 65. As might be expected, the results in the academic classroom are neglible, as compared with a normal group. Neglible as it may be, however, a decided effort is being made to give instruction which is in relative relation to the standards of the average, normal classroom. In another group will be found retarded pupils, retarded because of illness, absence for other reasons, or because of the inability to go to school at all, or for a very limited time only during each year. The classification of this group is as follows: A, 98; B, 86; C, 87; D, 92; E, 105; F, 82; G, 82; H, 91; I, 101; J, 100; K, 108. Although the classification shows a much higher standard than the former group mentioned, it will be noted that they are quite carefully grouped according to their quotients.

Following the suggestions given in the foregoing, a reclassification was made of this group for instruction purposes. Through the survey which was made it was discovered that boys B, C, F, and G were in reality what has been heretofore termed as on the border line. Not a border-line "defective," but each boy was at the point where neglect would place him on the wrong side of the ledger, while some intensive study and thought on the part of a teacher would place him somewhat "in the clear," so to speak.

The third group which has been mentioned is a decidedly heterogeneous group, thrown together in the shops as a group but reclassified for instruction purposes into small groups where similarity of conditions is given due consideration. The members of this group, and reasons for their being placed in the special class, are classified as follows: A, with an I.Q. of 80 has been ill, and is thus retarded as far as his normal grouping is considered, but with careful instruction

will soon be able to rejoin his group. B, with an I.Q. of 68 is really what is termed as a mental defective, as is C with an I.Q. of 60, and D with a quotient of but 50, E, with an I.Q. of 76 has been ill, F, with 73 is termed as a border-line defective. G, with 77 is a type which is quite often referred to the shop teachers. He is very far below normal in his academic work, but is really a genius with tools of all kinds. He is slovenly in his written work, yet exceptionally neat and painstaking with his mechanical work. This is another boy who may not be able to read until he is given the kind of reading which appeals. The boy who is interested in mechanics, may through this interest, develop interests in other phases of work and living. In this group there are two boys, H, with an I.Q. of 78, and I, with an I.Q. of 93, who really are nothing but pure and unadulterated cases of "that tired feeling" and they really are a difficult proposition for any teacher.

How to Solve the Problem

There may be many and diversified programs which may, profitably be offered to classes such as those mentioned. It will not be amiss, however, to offer one solution which has been tried and found to be quite successful in dealing with such groups. No claim is made that the individuals are fully fitted to take their place in the world as well-prepared mechanics. Neither is it claimed that they will be entirely self-supporting members of society, but it is claimed that the individuals are *better* prepared to take their place than they would have been without the assistance of the shop training which they were given. They are given a foundation, and no structure is substantial without a firm foundation.

The following program has been offered with the first group mentioned in this article. A project was selected which could easily be connected up with the regular classroom work of the group; in fact, the project was developed in the classroom, with the shop as the place for construction. In this case a railway system was selected which included the construction of all necessary buildings, the laying of the tracks, the establishment of a semaphore system, safety devices, and, in fact, all the elements which would go into the construction of a railway system. The first step was the construction of the area over which the road would be built, including the necessary hills and valleys, creeks, rivers, etc. It is hardly possible to conceive the amount of interest which was evidenced in the study of geography. After deciding upon the necessary number of hills, etc., which should be included, the "country" to be traversed was constructed by having the boys tear old newspaper into shreds, soaking them for two days and then pounding this mixture into a pulp which was squeezed dry and resoaked in a solution of water and glue. A large platform was built and on this the paper pulp was placed and the hills and valleys were formed, and here there was considerable work done on the appreciation of nature and all its beauties, both in the shop and in the regular classroom schedule.

Before going any further with the project, the boys were asked to enumerate all the things which they had ever observed on or about a railroad in order that the articles which would be constructed might be selected from their own suggestions. Let us not forget that these boys were considered as mentally deficient, yet they named over ninety different things which in their opinion should be included in the system. If one imagines this an easy matter, take pencil and paper, retire to a secluded place, and write down the names of ninety different things which should be incorporated in a railway system. It is admitted, however, that some of the items suggested would puzzle the best maintenance expert of the nation's best railroad. Nevertheless, they came from the boys' own minds and as many of them as was possible, were utilized. The suggestions were also utilized as exercises in spelling in the classroom, thus keeping the project idea fresh in their minds. With pupils of this kind, it will be found that learning is more of the memory rather than of the rational type, and the more the subject can be kept before them the better the results. Not only were the suggestions used for spelling exercises, they were also used in the study of sentence construction and in many other ways.

After a definite decision was made as to the things to be included, the boys made cardboard models of the buildings, engines, cars, water tanks, etc. Upon the completion of the models in cardboard, the same buildings were made of thin plywood, using the cardboard models as patterns. These were painted in bright colors, and it was surprising to see the results, and it certainly was a pleasure to witness the pride which was evidenced on the part of the boys when they could "show off" their handiwork. A real cinder roadbed was constructed, ties were cut, and tin was used for the rails. Telephone and telegraph poles were set, tunnels were built when necessary, bridges were constructed over the rivers, concrete reinforcing was placed at dangerous cliffs, and in the end a real railroad stood before them. With it one could find highways and superhighways, all of approved cement construction, a real village with business places, sidewalks, parks, etc. On one of the hills a great forest grew which was very cleverly made up of varying sizes of sponges cut to represent the oak, the pine, and the maple. All crossings were carefully guarded, with one exception, and here many grave accidents occurred with great loss of property and life. Taken as a whole, the project taught these boys many things which they would not have obtained otherwise. It was concrete, specific teaching and it is claimed a foundation was laid. These boys are better able to understand, they have learned to coöperate with one another and with a leader, and they are somewhat better prepared to analyze things for themselves. Other projects would fit into the program equally as well, such as the construction of a model farm, a model city, a model factory, a model home, etc. There is no end to the things which can be included. History can be made interesting and clear by the construction of frontier homes, Indian settlements, fortifications, etc., and many other subjects can well be used as a basis for project correlation.

With the other groups mentioned, several programs may be utilized. While shop problems previously consisted of manual subjects, such as weaving, basketry, pottery work, clay modeling, etc., the present tendency

is to utilize such practical subjects as household mechanics, rough carpentry, sheet-metal work, and a great variety of semiskilled occupations. This must necessarily be determined by observing the capabilities of the child, by a careful study of home and community situations, and through the trial-and-error method. Whatever program is adopted, it should at all times be specific and concrete, and based on a strictly utilitarian basis, rather than a basis of formal discipline or cultural education.

As was previously stated, it is indeed a task to prepare the normal child for our ever-progressing world. It is a still greater task to prepare the type of child mentioned in this article. We have a great responsibility before us. Let us be up and about our business.

Which, Three R's or Three R's Plus Industrial Arts and Domestic Science?

*Arthur Feuerstein**

IN the dramatic productions of the school the usual part of the industrial-arts and domestic-science classes is to furnish the scenery and costumes. The theme is usually selected from some other subject as history or English. While this practice is advantageous in bringing out and clarifying certain facts of the subject from which the play is taken, the interest of those who make the scenery and costumes is not of much concern to those who are chiefly interested in the industrial and domestic arts.

Industrial-arts and domestic-science teachers, however, are also interested in stage productions that will reflect credit upon their departments and place them on a par with the other subjects. The play that is given here, centers entirely around the aims of the industrial and domestic arts and by depicting the events in two different homes offers argument and rebuttal clearer in many respects than could be given in a newspaper article.

Since the industrial-arts department and domestic-science department work hand in hand in many respects, two subjects were combined in this play.

CAST

Home *A*	Home *B*
MOTHER	MOTHER
FATHER	FATHER
GRANDFATHER	GRANDFATHER
JOSEPH (son)	FRANK (son)
JANE (daughter)	GRACE (daughter)
WILLIE (son)	RUTH (neighbor)
DELIVERY BOY	

ACT I

Place — Living room of Home *A* and kitchen of Home *B*.

Time — Saturday afternoon.

NOTE: Stage is partitioned in the middle to represent rooms in two different homes.

[*Curtain opens on Home A. Mother is reading a book, father is reading the newspaper, and daughter Jane is manicuring her nails.*]

JANE. Mother, where is my blue dress?

MOTHER. I sent it to the seamstress to have it mended.

FATHER. Couldn't Jane have mended it?

MOTHER. She doesn't know how.

FATHER. Couldn't you help her?

MOTHER. I haven't time and besides I don't know whether I could.

[*A knock at the door. Father opens the door.*]

FATHER. Come in.

[*Boy enters.*]

BOY. I've been ringing the bell the last ten minutes.

FATHER. I know, we ordered an electrician to fix the bell last week, but he hasn't come yet.

BOY. Here's a dress from Mrs. Jones, the seamstress — and here's the bill.

FATHER. GOOD NIGHT, TWO DOLLARS to mend a girl's dress — well, here it is.

BOY. Thank you, good day.

FATHER. Good-by.

[*Boy exits.*]

[*Father sets dress on table. Jane examines it then continues manicuring. Father and mother continue reading.*]

(Curtain opens to include kitchen, room *B*)

[*Action in room B. Mother and Grace are sewing; Frank is connecting the door bell.*]

MOTHER. Were you sure to allow a little overhang?

GRACE. Yes, that was one of the first things we were told to remember at school. See, mother, you can hardly see where I mended it.

MOTHER. That's fine, dear — and without any help.

[*A knock is heard at the rear door.*]

GRACE. I'll go, I am sure it must be Ruth Wiggins who was going to show us something.

[*Grace goes to door.*]

GRACE. Come in, I can hardly wait to see what you have.

RUTH. And I can hardly wait to show it to you.

[*Ruth unwraps a package and displays a dress.*]

GRACE. Isn't that lovely?

MOTHER. Did you buy it in Stamford?

RUTH. No, I made it at school this term.

[*Father enters.*]

FATHER [*to Ruth*]. I can see where some man is going to be lucky some day. [*Turns to son.*] Say son, what are you doing?

FRANK. Oh, mother said the front door bell wouldn't work so I'm fixing it. I helped put some bells in our school shop this term.

FATHER. I'm going out to look over the automobile and get ready for our trip tomorrow.

FRANK. Next year we are going to have a Ford

*Director of Industrial Arts, Rogers School, Stamford, Connecticut.

motor in our school shop, then I'll be able to help you, too.

[*Father exits.*]

FRANK. Grace, will you hand me the tools so I can finish quickly?

GRACE. Sorry, Frank, but I promised to make muffins for dad's supper. Will you stay, Ruth? I know mother would be glad to have you.

MOTHER. Yes, do.

RUTH. I would like to but mother isn't feeling well and I want to help with dinner, too. I must be going now.

MOTHER. Come some other time.

GRACE. Good-by, see you again.

[*Ruth exits.*]

[*Grace starts ironing her dress and mother continues sewing.*]

(Conversation continues in living room, room *A*)

JANE. Now I can go to the dance tonight.

MOTHER. How about your homework?

JANE. Aw gee, that old stuff. All we get is multiply, divide, and subtract and then subtract, divide, and multiply. Drill, drill, drill. What's the good of it all anyway? We drill, drill, drill. Reading, writing and arithmetic, drill, drill, drill.

[*Jane exits.*]

MOTHER. I don't know what I am going to do with that girl. She has no interest in school whatever and her brother is still worse.

FATHER. Joseph simply must learn. He's going to college — if I ever finish paying these bills.

MOTHER. I hope Joseph does go to college — but suppose he doesn't. You know so many boys plan to go to college but never get there.

FATHER. Then I suppose he'll pick up the first job that's offered him like I did and then wander from one job to another. I'm sick of it.

MOTHER. But Henry, why didn't you start with a job you liked?

FATHER. How did I know. Nobody ever told me the advantages and disadvantages of different kinds of work. All father ever told me was, "don't do what I'm doing." That's probably the only reason I haven't tried being a storekeeper as he was. I'm going to play golf and see if I can forget work for a little while.

MOTHER. And I must go to the delicatessen store and get something for supper.

(Conversation continues in kitchen, room *B*)

GRACE. Now for the muffins.

MOTHER. And I must go upstairs and look for that material you need at school. How much do you need?

GRACE. Three and one-half yards will be enough. We figured it out in our arithmetic class and found that dresses for the whole class will cost thirty-two dollars. If we bought them they would cost one hundred and twenty-five dollars.

FRANK. Gee, arithmetic is useful, isn't it?

GRACE. I like it, too. Are you going to be an electrician, Frank?

FRANK. I don't know. I used to like woodworking, but now since I have done some electrical work I like that. Some of the fellows are waiting for the Ford motor to come. Maybe I better experiment with that, too, and see what kind of work that is. I don't want to decide too quickly.

(Conversation in room *A* continues)

[*Father enters dragging a bag of golf clubs.*]

FATHER. I guess mother hasn't got back from the delicatessen yet. From the looks of the pantry shelves, she spends most of the day there.

[*Joseph enters.*]

FATHER. Joseph, where have you been all afternoon?

JOSEPH. Up the street.

FATHER. Huh, I know what that means, over to Dan Kelley's poolroom.

JOSEPH. A fellow's got to do something.

FATHER. I bet you never see Frank Brown there.

JOSEPH. He doesn't care for pool.

FATHER. When I was a boy, . . .

JOSEPH. Yes, I know. When you was a boy you had a big barn you could play in. You could make all sorts of things and rig up a regular gymnasium. What can I do in this four-room apartment?

[*Little Willie enters.*]

WILLIE. If you wouldn't make so much noise I could do my studying.

JOSEPH. You'll get over that studying before you reach the seventh or eighth grade. You'll be so filled up with those three R's. . . .

[*Grandfather enters.*]

GRANDFATHER. What's all this rumpus about? When I went to school that's all we had and what's good enough for your grandfather is good enough for you. Why Sonny, I could say the times tables backward and forward. I could tell you the capital of every state in the Union.

JOSEPH. You didn't have automobiles, steam shovels, and vacuum cleaners either, did you?

GRANDFATHER. What good are they anyway. Give me a horse any day. What's good enough for your grandfather is good enough for you.

WILLIE. Say Joe, where's Bangor?

JOSEPH. Ask grandfather, he knows.

WILLIE. Grandpa, where's Bangor?

GRANDFATHER. Bangor — yes — let me see — oh yes, that's the capital of —— I used to know but I've forgotten.

[*Mother enters.*]

[*Grandfather exits.*]

MOTHER. I had to go into three delicatessen stores before I found anything decent, and then I had to take some potato salad that doesn't look any too good.

FATHER. That's cheerful news. What else have you for supper?

MOTHER. Here's the bill. I got bologna, potato salad, baked beans, pickles, and some Ward's cake.

FATHER. Sounds like Heinzes' complete list. Heaven help us if we ever lose the can opener.

MOTHER. I won't be long.

[*Father starts reading.*]

[*Mother exits.*]

JOSEPH. Say dad, will you give me a quarter to go to the movies tonight.

FATHER. I've no money to throw away.

JOSEPH. I can't stay home all evening and do nothing.

FATHER. Do your homework.

JOSEPH [*aside*]. I'll ask mother.

[*Joseph picks up newspaper, starts to read, then lays down paper and exits.*]

Curtain closes on room *A*.

(Conversation in kitchen, room *B*, continues)

FRANK. Grace, I'll let you have the honor of being the first to ring the bell.

GRACE. Yes, and get a shock. I'll let you have the honor of tasting my muffins.

FRANK. Yes, and get indigestion. But I'm game.

GRACE. And so am I.

[*Grace gives Frank a muffin and then runs out and rings the bell.*]

[*Grace returns.*]

GRACE. It works, I heard it. How does the muffin taste?

FRANK. Like more.

GRACE. That's good. I know dad will like them, but I wish supper was over so I could get some more work done on that new dress before class time on Monday.

FRANK. And I want to draw plans for the new job I am going to start in the shop Monday.

[*Grandfather enters.*]

GRANDFATHER. I heard the front door bell again. It beats the old-fashioned knocker. I remember one day we went to each door to find out from what door the knock came and it was a woodpecker in the old oak tree, ha, ha.

FRANK. That was a good one on you, grandpa. Now we have different-sounding bells for each door and sometimes a buzzer.

GRACE. Don't forget, too, that the vacuum cleaner makes mother's work easier and that the electric refrigerator keeps the messy iceman out of the house.

GRANDFATHER. I don't doubt that all these new things are handy, but who is going to repair them when they get out of order? Anybody could put a piece of wire around a broken broom and it was fixed and a little stuffing in the ice box would stop a leak, but who can fix these new-fangled things?

FRANK. That's where our shopwork comes in handy again. Last week mother's toaster wouldn't work and I fixed it. Several other boys have repaired electric heaters, too. Here is a toaster Alfred made. He loaned it to me to copy.

GRANDFATHER. How long did it take him to make that?

FRANK. About two months, you see we have industrial arts only 90 minutes a week.

GRANDFATHER. A good job, Frank, a good job. I can see that the schools are trying to keep up with the times, but 90 minutes a week. It takes a mechanic about that long to get his tools out.

FRANK. Some may have more time next year. You see some boys need more shopwork than others, depending upon what they expect to be.

GRANDFATHER. That's a good idea and I suppose some go to the State Trade School.

FRANK. Yes, those who want to learn the trade, but most boys need the experience of our shop just for repairing their own homes some day.

GRANDFATHER. I can understand that. The trade school for trade training and the industrial-arts shop for general experience. Well, I guess I'll go take a nap before supper. I'm not as young as I used to be.

GRACE. We'll call you when it's ready.

[*Grandfather exits.*]

FRANK. I'm going out and see how near finished father is.

GRACE. And I must see mother.

[*Both exit.*]

[*Curtain closes on room B.*]

ACT II

Place — Same as act I

Time — Saturday evening

(Curtain opens on room *A* only)

[*Mother is reading a book, and father is reading a newspaper.*]

FATHER. Where's Jane?

MOTHER. She went to a dance.

[*Both continue reading a minute or two.*]

MOTHER. Where's Joseph?

FATHER. He went 'up the street.'

[*Both continue reading.*]

(Curtain opens all the way to room *B*)

[*Mother is reading a book, Grace is sewing, Frank is drawing, and father is leaning over looking at Frank's plan.*]

FATHER. Are you going to make that in the shop?

FRANK. I am going to try. I wish you'd come over and see our industrial-arts rooms.

GRACE. I want you to see our domestic-science and art rooms, too.

MOTHER. Father, don't you think we ought to know more about the modern school?

FATHER. I do, mother, and I am going to. The school has held exhibitions and open visiting days and nights and we have failed to go, but we'll NOT miss the next chance.

FRANK. And I'll have this model motor boat working by that time, too.

GRACE. I ought to have my dress ready for the next exhibition also.

[*Father continues watching Frank draw. Sign drops in center of stage bearing the one word, "Which?"*]

(Curtain)

Guidance in a Large College or University

*William L. Hunter**

THE following gives an outline plan for guidance to and on a large college or university campus. Let us imagine a boy in junior or senior high school who is thinking of entering the professions. The first item in the outline is intended to enable him to decide intelligently on the institution he may attend most profitably and the remainder of the outline is an effort to help him during his four or more years of preparation.

The bureau of five members which is suggested will

*Assistant Professor Industrial-Arts Education, Iowa State College, Ames, Iowa.

be sufficiently large, with office help, to take care of a college containing from 1,000 to 2,000 students. Each college, school, or major division of a large educational institution should have its separate bureau, but these six to a dozen bureaus should have a single supervisory officer whereby the common problems might be satisfactorily solved. Due to the space required to discuss the plan in detail the proposal is submitted in outline form. Some of the functions delegated to the bureau may rightfully belong to other departments of administration, however, the guidance department may well coöperate when such is the case.

The expense necessary to maintain such a bureau might seem to be prohibitive but cost must always be compared with value received. The increased success of the students, the elimination of aimless wandering, the quicker allocation to proper classes, and the increased teaching efficiency of the faculty — these alone would pay big dividends on the investment.

A bureau of vocational guidance composed of five members, a vocational counselor, a psychologist, a statistician, a placement officer, and a dean of men (dean of women also if the school is coeducational). These are to be provided with a separate budget and are to have the following duties:

A. Dissemination of authentic and understandable information to prospective students.
   1. How the college ranks with other institutions.
      a) Acceptance of credit by others.
      b) Professional preparation of faculty members.
      c) Statistical comparison of faculty with that of other institutions.
      d) Tuition, scholarships, annual budget, endowments, etc.
   2. Acceptance of students and elimination methods.
      a) Preparation required.
      b) Psychological examinations — Median I.Q. level and standard deviation.
      c) Percentage of failures each year and in each major course.
   3. Flexibility of curriculum.
      a) Tryouts permitted.
      b) Ease of transfer during first two years.
      c) Variety of offerings.
   4. Median yearly expense to students.
   5. Proportion of graduates in the occupation actually prepared for.
   6. Median beginning salary for graduates — figures for graduates of other institutions also.
   7. Median salary after ten years — other institutions also.
   8. Percentage of graduates placed by the institution.
   9. Rank of school's graduates known nationally or listed in — *Who's Who,* etc.

B. Direction and assistance to students upon their arrival on the campus.
   1. Information bureaus.
   2. Recommendation of suitable rooms.
   3. Map of city showing reliable banks and business concerns, and other data.
   4. Student employment bureau.
   5. Student loan fund.
   6. Get-acquainted meetings.

C. Assistance in temporary registration.
   1. Giving advice as to proper procedure.
   2. Furnishing mimeographed information.
   3. Providing tryout periods in all classes.

D. Giving psychological examinations and temporary classification into bright and dull groups.
   1. Intelligence tests.
   2. Inventory of student's present knowledge.
   3. Noting of possible special difficulties.

E. Establishment of freshman orientation courses.
   1. Explanation of college procedure.
   2. Relations to others.
   3. Successful methods of conduct.

F. Arrangement of individual conferences with students and instructors.
   1. What student is interested in.
   2. What the student hopes to get.
   3. Possible suggestions as to avenues of study.

G. Reclassification of students at the end of the first semester or quarter on the basis of combined I.Q.'s, grades, and interests.
   1. Encouragement of those who are progressing according to their ability.
   2. Conferences with those who are loafing on the job.
      a) Possible transfer to a more likely field of interest.
      b) Diagnosing of trouble and giving possible remedy.
      c) Use dismissal as a court of last resort.

H. Establishment of unity and understanding between the various departments of the college.
   1. Each faculty member should know the position which every other member takes in regard to controversial questions related to the college curriculum.
   2. Elimination of faculty stratification.
   3. Elimination of overlapping of subjects.
   4. Social "get-togethers" of the faculty.

I. Arrangement of addresses, group conferences, clubs, excursions, meetings, and banquets.
   1. Men of national authority in certain vocations.
   2. Meetings of people of similar interests.
   3. Regular meetings of professional fraternal groups.
   4. Conducted excursions to local points of interest.
   5. Encouragement of student attendance at state and national meetings related to their work.

J. Formulation of courses of study and supervision of life career classes.
   1. Give broad social outlook to student.
   2. Give student a chance to look at his own probable occupational contribution from the viewpoint of society.
   3. Help student formulate his own life plan.

K. Arrange for survey and analysis of an occupation by the prospective entrant.
   1. Observation of working conditions in the occupation which he intends to enter.
   2. Analysis of duties of a successful member.
   3. Inventory of and preparation in the qualities which he may lack.

L. Keeping accurate, detailed and accumulative records of each student.
   1. Grades in each subject — grades below average to be followed by reasons from instructor.
   2. Social status of extracurricula accomplishments.
   3. Special aptitudes, I.Q., and attitudes.
   4. Experience or other qualifications.

M. Viséing all examinations which are given to students.
   1. Elimination of knowledge for the sake of knowledge.
   2. Is there agreement among authorities as to the proper answer to the questions?
   3. Will the examination actually measure the student's ability or accomplishment to a fair degree of reliability?

N. Giving mental hygiene assistance to students needing it.
   1. Disturbing factors in the individual's life.
   2. Help the individual to become integrated by understanding himself.
      a) Courses in mental hygiene.
      b) Books or confidential talks by a competent person.

O. Coöperating with national guidance and vocational bureaus and associations.
   1. Furnishing results of vocational studies.
   2. Receiving and using data which others have prepared.
   3. Contributions to magazines and meetings.

P. Assist in the revision of the college curriculum to meet actual demands.
   1. Finding out from alumni the value of courses.
   2. Inclusion of a larger proportion of apprenticeship training.
   3. Keeping up-to-date on changes outside the college classroom.
   4. Elimination of duplicated courses in different departments.

Q. Improvement of faculty instruction.
   1. No faculty inbreeding — at least a graduate should not be allowed to teach in his alma mater until five years of proved service elsewhere.
   2. Elimination of snap courses.
   3. Insist that required courses be made interesting.
   4. Require that every instructor, at least once during the year, shall have visited one class conducted by each of the other instructors in his department.
      a) Faculty discussion at least twice a year on the successful methods which have been observed.
   5. Sabbatical leave on full pay during which time the teacher must not engage in teaching.
   6. Higher salaries with longer and more efficient service.
   7. An unbiased teaching efficiency rating of all the faculty; published each year.

R. Trouble department for students.
   1. School matters.
   2. Personal affairs.

S. Placement.
   1. Graduates.
   2. Those in need of new positions.

T. Follow-up and supervision where wanted.
   1. Extension education.
      a) Institutes.
      b) Lectures.
      c) Short-unit courses.
      d) Correspondence study.
      e) Results of new studies and investigations.
   2. Assistance in making surveys.

References

R. L. Kelly, *The Effective College,* Association of American Colleges, 1928, 302 pp.

Rita S. Halle, *Which College,* The Macmillan Company, 1928.

L. A. Maverick, *The Vocational Guidance of College Students,* Harvard University Press, 1926, 251 pp.

H. E. Hawkes, *College — What's the Use,* Doubleday, Page and Company, 1927, 143 pp.

W. W. Comfort, *The Choice of a College,* The Macmillan Company, 1925, 55 pp.

Apprenticeship in the Baking Trade

*C. L. Conroy**

WHILE conducting an occupational survey a year or so ago, the writer discovered several new fields of industry that seemed to offer opportunity for apprenticeship training. One of these was the baking industry, which is generally omitted from the average program of vocational training and apprenticeship.

In practically every town larger than a village will be found a bakery, which has taken over the task of doing most of the baking formerly done in the home. This industry today stands as one of the leading ten or twelve important industries in the United States. The number of shops and plants are so widespread and the industry employs so many, that it should warrant the attention of the school to investigate the possibilities of coöperative training. No doubt there are numerous vocational schools which can add this activity to its program. With this in view, the writer feels that by passing our experience along, other schools may be helped to develop similar classes.

To begin with, we discovered that there were four bakeries in our community, a town of approximately 24,000. Two of these shops are quite large and do a large wholesale business in both the city and outlying country villages and general stores. At first our suggested plan of apprenticeship training was accorded but little interest, in fact one plant was antagonistic.

*Coördinator, Vocational School, Manitowoc, Wisconsin.

APPRENTICES LEARNING BAKER'S TRADE, MANITOWOC VOCATIONAL SCHOOL, MANITOWOC, WISCONSIN

A second employer agreed to give it a trial for several months. A third, a small shop, was receptive but didn't want to take on an apprentice at that time. After several visits to the proprietors of the two large shops, each finally agreed to accept two boys, who were to be recommended by the school. Of course, a study was made of the baker's trade to enable the school to give any interested boys reliable occupational information.

After an announcement, a number of boys applied for these opportunities. All applicants were interviewed carefully and the details of the trade and apprenticeship explained. Boys who were just looking for temporary employment or a job until something more to their liking turned up were eliminated. The success of the venture depended on the placement of boys who really had a desire for this type of trade and were able to fulfill the requirements, because the early lack of enthusiasm and distrust on the part of some employers had to be overcome. We therefore recommended our two best prospective apprentices to the most skeptical shop proprietor and it proved the means of breaking down his opposition completely. The boys, of course, were told that not only their personal progress in the trade, but the progress of the apprentice program in baking, so far as this shop was concerned, depended upon the impression they made. They accepted the challenge and both made good. In fact, this employer sent in a request for another boy several months later. The other shop owner signed up two boys also. One of the latter made a fine record, but the other turned out to be a failure. This was due to some trouble which developed between him and a foreman who was not in sympathy with apprenticeship.

Let it be said at this point, that much of the success of apprenticeship depends on the foreman. He can do much to aid the apprenticeship movement by coöperating with the employer and school. It is he who must see that the apprentice is taught the various elements of the trade as outlined in the contract, and it is he who must build up in the apprentice the proper attitude toward his work. An antagonistic foreman can in many small ways make life miserable for an apprentice and spoil the efforts of all others concerned. Such a foreman must be sold on the apprenticeship idea, or his lack of coöperation must be pointed out to his employer. In the case cited, the employer insisted on the proper coöperation of his foreman.

The contract drawn up for each apprenticeship was the regular indenture fostered by the Wisconsin Industrial Commission. It called for three years of service, during which time the employer was to teach such elements of the trade as were outlined in the contract. A minimum of 400 hours were to be spent in attendance at the vocational school for related instruction. The maximum hours of labor were set forth and the wage scale stated for the three-year period. The apprentices started out at $10 to $12 per week and receive raises at the end of every four months. At the end of their apprenticeship period, they will be receiving $22.50 to $24.00 per week, and upon completion of the stipulated time, are entitled to journeymen's wages. There is a slight difference in the scales of the local shops but neither the school nor the Commission dictates the wages paid. It is desirable to have it uniform in all plants, but our main object was to get the apprenticeship idea started, and this was not to be jeopardized by too much quibbling.

One matter arose that threatened the peaceful progress of the venture. One of the employers raised the wages of one of his apprentices above that called for in the contract. The result was a wrangle with the other apprentices who all wanted the same wage increase. The employers were cautioned not to depart from the scale agreed on in the future and henceforth there will be no trouble from this source.

Arrangements were made to hold the vocational-school classes for these apprentices on Monday afternoons. Hence an instructor had to be obtained. One of the local bakers who runs a small but high-grade bakery with lunchroom combined, is an expert baker himself, has a fairly good education, and an excellent business training. He was approached to teach this class for four hours each week. He had no apprentices himself as his shop is small and he does most of his own work. However, his attitude toward education and boys is splendid. His objection, that he couldn't teach, was finally overcome. The Milwaukee Vocational School has a finely equipped baking department and we appealed to them for some immediate assistance. They furnished us with excellent lessons covering the related phases of the trade.

The large yeast manufacturing companies sent some valuable material and The Fleischmann Company furnished us with an excellent textbook *A Treatise on Baking*, at one dollar a copy.

The first two hours of each meeting are spent in class discussions in related work. The instructor also uses this time to teach some practical academic work according to the needs of the individual. The last two hours are generally spent in the school kitchen where practical instruction and demonstrations are given. A few additional utensils, such as mixing bowls, a scale, etc., were purchased. At times the instructor takes the class to his own shop for actual practice on certain work, at which time he pays for all materials used, because most of the product is salable.

This man is listed as a part-time instructor and on his salary the school receives federal aid. Much of the success of the class has been due to his interest and personality. The choice of an instructor is most important and any school considering this type of a class must employ an A-1 man. He must have the attitude that lends itself to such work and should be willing to receive suggestions from the school. The students will very soon find out his ability, and woe be unto him if the class finds that he is not a master of his trade. Although this type of a part-time teacher may lack the knowledge of teaching methods, yet the trade knowledge and practical business experience which such a man possesses insures the best chances for success. It would be a mistake to let a cooking teacher handle this class even though it might be more economical to do so. We believe that these types of trade classes even though composed of small groups, warrant the hiring of first-class instructors.

The foregoing describes but one example of what may be done in many other lines. In almost every city there are special trade groups, which are not recognized by the regular curriculum. A little planning and some expenditure will do much to extend training opportunities to the worthy boys and girls who are interested in them.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. METZ, Editor

VOCATIONAL TRAINING AND THE MACHINE AGE

The statement is made that the machine age has on the whole created more jobs for men than it has lost for them. Nevertheless, it must be admitted that the economies affected through the intervention of the machine are constantly lessening the demand for man power. The machine age has not exhausted itself. The elimination of man power has by no means come to a dead stop. The genius of the inventor is continuously producing new devices and machines that excel the old in point of labor saving.

In the light of this situation, J. C. Wright, director, Federal Board for Vocational Education, recently said: "Vocational education needs to travel parallel with industrial progress. As new machines are invented people must be trained to use them; as new technical information is applied to agriculture, manufacturing, commerce, and the home, our people must be educated so as to be able to think in terms of this information and their job.

"The scientist and the inventor must, and do, precede the application of their discoveries to the work of the world; but workers must be trained to use the results of the inventor and the scientist before society can realize on the benefits of these inventions and discoveries.

"The flow of production widens and deepens. A great many jobless men pour out of the doors of factories, giving way to the advent of the new machines. In seven years the number of workers in what are called the productive industries fell off one million five hundred thousand, according to an estimate made in the Department of Commerce."

The decline in employment must, in the long run, be met in some form or manner. Statesmanship is beginning to turn its attention to a solution of the problem. While an industrial depression may afflict the labor market in a temporary way only, it nevertheless remains an open question whether the machine age is not making permanent inroads on the labor situation.

Experts tell us that in the wake of an invention follow new jobs, that in the march of progress new desires, new needs, new appetites are created which someone must gratify. We are told that the ranks of the insurance worker have been increased to a remarkable degree, that the cinema and radio industries have created many thousands of new jobs.

Mr. Wright in commenting upon this phase of the situation says: "The moral which we who are engaged in vocational education should draw from this situation is an appreciation of our responsibility for providing the two million, five hundred thousand adult workers with the necessary help in selecting their new job and in securing vocational training and education for efficient service to their new employer.

"Without an opportunity to adjust themselves to these new conditions — to the new demands of industry, calling for new skills and new technical information — many will fall by the wayside and become idle parasites, dependents, criminals, or unnecessary victims of the 'iron man.' "

This being true, it follows that vocational education must be made available to more and more people. Not only must the young be served, but the adult as well. Evening schools and part-time instruction for the unemployed must therefore be organized in our schools to an increasing extent to the end that our educational machinery keep abreast of the onrushing events which make possible the marvels of the machine age in which we are living.

THE RADIO AS A FACTOR IN VOCATIONAL EDUCATION

It is becoming increasingly evident that the radio is gradually finding its way into the schools, and may eventually hold a fixed place in the general scheme of popular education. At any rate, the advent of the radio in the vocational school is announced. Educators are discussing here and there just how the innovation can render a maximum service, or rather what radio service would serve the cause of popular education best.

Its acceptance as a factor in home life is established. It entertains as well as instructs. Social circles, however, invite entertainment rather than instruction. The schools, on the other hand, would demand more instruction and less entertainment. Finally, they will demand a clearer understanding as to just what that instruction shall be.

Discussions, bringing out both favorable and unfavorable opinions, have been engaged in. The objectors hold that the radio is an expensive and experimental innovation which tends toward a low form of entertainment. The supporters of the radio uphold its possibilities as a distinctive aid to all branches of schoolroom studies including the vocational.

In dealing with radio from the standpoint of the school, it remains that its proper place as a part of the curriculum is yet to be found — or rather that the "air school" is still in the making. But with characteristic American alertness and enterprise, leading educators are concerning themselves with the subject. It is already clear that studies in music, art, social sciences, nature studies, geography, health and hygiene may be broadcasted with profit, alike to child and adult.

One of the promising departures, in the direction of an organized and properly defined plan as to subject matters, has been announced. One of the larger broadcasting systems is to be employed in inaugurating the plan under the leadership of Hon. Ray Wilbur, Secretary of the Interior; John William Cooper, United States commissioner of education; Dr. William C. Bagley, Teachers College, Columbia University; Henry Turner Bailey, Cleveland Museum of Art, etc.

A bibliography of subjects to be presented has been prepared. A faculty of sixteen of the most distinguished American educators has been chosen. It will remain for the several broadcasting stations throughout the country to provide readings that will be suited for classroom instruction, and the individual school must adjust its daily program so as to avail itself thereof.

Finally, it may be said that the advantages which a radio recitation may possess in augmenting the work of teacher and textbook, have not been fully unfolded. Experiment and experience will determine. The opportunity of inviting the voice of the nation's great educators into every classroom at least is in sight. The privilege of hearing the leaders in education, which is now confined to the few, may thus be brought to the service of the many.

—⌖—

VOCATIONAL TRAINING AS A CRIME DETERRENT

The subject of industrial-arts and vocational training has in recent years been discussed from every possible angle, and its place as a factor in the economic and social life of the nation is established. In this connection it may be stated that this type of training has by no means reached its full fruition in this country, nor is it as yet meeting with any degree of completeness the needs of an everexpanding industrial system. Much more remains to be accomplished.

One of the phases of industrial-arts and vocational training which has of late come into wider discussion touches its relation to the subject of crime. Those who have concerned themselves with the task of restoring the criminal as a useful citizen, have resorted to this type of educational work as the first and most effective means in that direction.

But since prevention is better than the cure, modern sociologists and educators are giving more and more attention to these educational subjects as a crime deterrent. In New York City a movement has been started whereby every district is to have a crime prevention committee to look after the youth and prevent him from entering upon a criminal career.

The New York City Crime Prevention Commission is fostering a more widespread activity in behalf of the cause for which it stands. While the educator holds to the teaching of morals and manners as a prime requisite, and the inculcation of precepts in correct conduct and thinking, he bears in mind that industrial-arts and vocational training are factors which cannot be ignored. The sociologist subscribes to this thought with more than ordinary readiness, "Criminals are made," says a New York sociologist, "because society neglects its potential citizens and fails to meet the needs of a modern day."

"In a local back-of-the-yards district," says the *Chicago Tribune*, "with 1,600 boys between 10 and 17, fully 450 to 500 boys are delinquent. In other districts, more ordered, prosperous, purely residential, there is no delinquency. That one boy out of three in some districts is naturally and inherently bad and that no boys are bad in other districts is hardly an intelligent answer to the problem of crime breeding in Chicago. The weaker boys of a community, it is true, are more likely to go bad. It is also true that thousands of boys, who under good conditions would lead a normal life, are led to crime in conditions in all great cities. Crime prevention is a civic and sociological problem of first significance."

While these boys need friendly treatment and sympathetic guidance, they need something more. They need something to occupy hand, head, and heart, and that means industrial-arts and vocational training. William Lewis Butcher, chairman of the New York City Crime Prevention Committee and member of the New York State Crime Commission, recommends that the industrial-arts work begin in the fifth and sixth school year. And what applies to New York City applies to Chicago and every other community where boys go wrong for the want of a proper guidance.

The fact remains that both industrial-arts work and vocational education will henceforth receive greater attention in dealing with the problem of the youth, as exemplified in the larger centers of population where physical and social environment are not propitious to child life and child training.

—⌖—

INDUSTRY IS INTERESTED

It is quite encouraging to hear from more and more cities that men high in industrial, commercial, and professional circles, are willing to give of their time and energy in order to give the graduates of our secondary schools some assistance in solving that vital question of how to make the proper vocational choice.

In some cities it is the Kiwanis Club, the Rotary or some other Service Club that undertakes the work of sponsoring these vocational-guidance programs for the members of high-school graduating classes. Of course, it is to be hoped that the young boys and girls who attend these exercises on the eve of their graduation, have had considerable vocational guidance throughout their high-school attendance.

Nevertheless, though the programs may be called eleventh-hour attempts, the mere fact that these busy men of affairs take enough interest in the on-coming youth, speaks well for the future progress of our country.

The sponsoring of these programs by influences outside of the school, gives them an added advantage. Too frequently the student gets into the attitude of thinking that information received at school is not as valuable as that which comes directly from the practical work-a-day world, hence these programs are very valuable because they act as corroborative evidence and give weight to the vocational-guidance information that has been dispensed at school. Even if this or that pupil would at this late hour get a new viewpoint on something which he thought was quite different, the vocational-guidance function of these programs are valuable, because this information comes to the student just at the time when he is entering life, and when there is still ample opportunity for him to correct any error that he may have made in his earlier educational choices. Much of his school preparation can be salvaged even though he decides at the last minute that the occupation, trade, or profession for which he had been preparing, is not the one which he cares to follow.

The interest displayed by men of affairs in the youth of our land gives promise that we are gradually departing from the time when America was quite satisfied to get much of its skilled labor from abroad, and when the belief was prevalent that professional men who have had received their training in foreign universities were to be preferred over those who had received their training at home.

Study of Industrial Education

*Lester C. Smith**

MANY surveys have been made in the field of education. These surveyors have set forth their findings and made recommendations in nearly every subject of the curriculum which has resulted in a more scientific evaluation of the aims, content, and methods of these various subjects. The present study was made to analyze the findings of several typical surveys in the field of Industrial Education and the article written to bring to teachers of this subject what surveyors have found about our teaching. This study is considered in five divisions: (1) readings, (2) indefiniteness of term, (3) conditions found in the surveys, (4) recommendations, and (5) trends.

Readings

This study is the result of readings in the field of Industrial Education in the following city surveys:

East Orange, N. J., E. C. Moore, 1912
Bridgeport, Conn., Van Sickle, 1913
Newburgh, N. Y., L. L. Potter, 1913.
Salt Lake City, Utah, E. P. Cubberley, 1915
Leavenworth, Kans., Monroe, 1915
Portland, Oreg., Cubberly, 1915
Grand Rapids, Mich., Judd, 1916
Buffalo, N. Y., Finegan, 1916
Cleveland, Ohio, Ayres, 1916
Denver, Colo., Bobbitt, 1916
Butte, Mont., Strayer, 1916
Alton, Ill., John Withers, 1917
Brookline, Mass., J. H. Van Sickle, 1917
Bloomington, Ind., H. L. Smith, 1917
Elyria, Ohio, U. S. Commissioner of Education, 1918
Utica, N. Y., State Department of Education, J. Finley, 1918
Janesville, Wis., W. W. Theisen, 1918
Columbia, S. C., Bunker, 1918
Binghampton, N. Y., State Department of Education, Wiley, 1919
Baltimore, Md., Strayer, 1920
Atlanta, Ga., Strayer, 1921
Fruita, Calif., Quigley, 1921
Lawrence, Kans., F. P. O'Brien, 1921
Appleton, Wis., Anderson, Giles, etc., 1922.
El Paso, Texas, Paul W. Horn, 1922.
Philadelphia, Pa., State Department of Public Institutions, 1922
Stamford, Conn., Strayer, 1922
Bayonne, N. J., Board of Education, 1924
Fort Lupton, Colo., Gauders, 1924
Marion, Ill., W. S. Monroe, 1924
Chanute, Kans., F. P. O'Brien, 1924
Hammonton, N. J., Strayer, 1925
Superior, Wis., Engelhardt, 1924–25
Galveston, Texas, Manuel, 1926
Racine, Wis., A. S. Barr, 1926
Napa, Calif., Sears, 1927
New Prague, Engelhardt, 1927
Fort Lee, N. J., Strayer, 1927

Indefiniteness of Term

In this field which the author has called "Industrial Education" we find terms undefined and vague, meanings obscure, and statements confused. The following terms were found in the forty surveys read: (1) vocational education, (2) vocational training, (3) vocational guidance, (4) manual training, (5) manual arts, (6) industrial education, (7) industrial training, (8) industrial arts, (9) construction work, (10) handwork, (11) practical arts, and (12) shopwork. Different appellatives might be found in other surveys but these are enough to demonstrate the uncertainty and looseness of thinking in this field. No other subject in the curriculum ever was in such a chaotic condition. This situation is all unnecessary and should be the subject of first consideration. The author would recommend three terms: (1) construction work, to refer to the handwork, or as some people call it, the seat work, given to children of the primary grades in their own rooms to illustrate facts learned in connection with some other subject; (2) industrial education, pertaining to educating the child in the general knowledge of the various industries; and (3) vocational training, meaning the actual training a child is given in any particular industry to enable him thereby to earn his living. Whether these particular names are agreed upon is not essential, but the terminology should be clarified and definitely stated.

Conditions Found in the Surveys

Before 1920 there was no work of any kind found in the surveys in the first two grades which might be considered in this field. In Denver, Colorado, Bobbitt found one hour per week given in grades three and four to the teaching of plan drawing and lettering and the making of a series of cardboard models. This work was done in the home rooms by the regular teacher.

In grades five to eight woodwork was found taught almost exclusively. In grades five and six this teaching was all done by the regular room teachers, who in every instance were women. In Brookline, Massachusetts, and Binghampton, New York, the teaching in the seventh and eighth grades was done by women in the regular rooms. In the schools of Bloomington, Portland, Leavenworth, Grand Rapids, and Denver, the teaching of seventh and eighth grades is done in well-equipped shops and by well-trained men teachers. Mechanical drawing was taught in Bloomington, while in Grand Rapids were found printing, concrete, and sheet-metal work. Denver taught the making of tools and Leavenworth offered wood turning for 80 minutes per week in the seventh and eighth grades. Much of this work consisted of sloyd and a series of joints or exercises quite apart from project making of actual worth. Denver taught excercises in wood for six years. Portland had a very inelastic course and a very limited variety of materials. In Leavenworth the work was found to be very formal in nature with no chance for initiative either by teachers or pupils. In Janesville, Wis., the course in seventh and eighth grades consisted in stereotyped series of simple models in wood that varied in difficulty of process as the pupil

*Head Industrial Education, University Chicago High School, Chicago, Ill.

advanced. There was no chance to work out newer ideas. The standards of work were very poor. In Buffalo alone was found the beginning of our present training in the industries. Children who had finished the sixth grade could enter a prevocational school where they were taught the old-line subjects for one-half day while the other school time was spent in actual work in shops, such as carpentry, printing, metal work, machine practice, structural and architectural design, steel and iron work, and wood turning. Satisfactory trade agreements had been made with the unions. This work was organized in a junior high school for grades seven, eight, and nine.

Most of the high-school work was elective and consisted of woodwork, mechanical and machine drawing, pattern and cabinet making, forging, joinery, metal work, wood turning, printing, machine shop, concrete, and sheet metal. Very few courses of study were found. A large percentage of the work was listed under the general term of manual training. Three cities, namely, Utica, Newburgh, and Bridgeport, had no shop facilities whatsoever in the high school. The only four-year sequences were found in Salt Lake City, where "squaring off" was emphasized for four years, and in Denver, where a four-year course in mechanical drawing was offered. This undefined and unrelated course of study only confirms the former statement relative to the looseness of thinking as evidenced by the terminology.

Since 1920 very little of what is usually called manual training was yet found in the primary grades. In fact, the Baltimore survey is the only one which refers to the work. Here grades one to four did construction work as a separate subject in their own rooms, with such materials as paper, cardboard, raffia, reed, and light wood. This did not seem to be related to other subject matter nor to any of the industries. Children simply made things as directed by their teachers.

In grades five and six the work is described in three surveys, namely, Baltimore, Racine, and Philadelphia. In Baltimore these grades made small projects of basswood and venetian iron in a well-equipped shop for 60 minutes per week. Philadelphia fifth and sixth grades were taught general handwork in the building trades, textiles, printing and book binding for a period of 90 minutes each week. Visits to shops and factories were a means of instruction. There were 34 well-equipped shops for these grades. Racine taught bench-work in wood to grades five and six for a period of from 50 to 90 minutes per week. This work was taught by five well-trained instructors and six principals who had no special training for this subject. A textbook was used in three of the schools. There was freedom to select their own projects in eleven schools with no attempt at a uniform course of study.

The work in grades seven and eight was more uniform and is described in ten surveys. Woodwork was the main subject taught but mechanical drawing was found in Racine and Chanute. Electric wiring, sheet metal, and printing were found in Chanute and Superior. In Superior was found a unique method of moving the equipment for these various units from building to building, thus making possible a succession of courses with but one equipment in each unit. The schools in these three cities were called junior high schools and typify the more progressive organization and teaching. Stamford, Connecticut, had developed an elaborate course of study by 1922 consisting of 21 models made from blue prints which were copied by the students as an example of formal sloyd work.

In the high schools, as found in the surveys, the work was of a greater variety and had taken on a distinctly vocational nature. In Philadelphia separate courses were offered, one vocational and the other non-vocational. Racine offered work in printing, cabinet-making, pattern making, machine shop, electrical wiring, and auto mechanics, but the shops were poorly equipped. Other offerings found were sheet metal, mechanical and architectural drawing, concrete, welding and forging.

Recommendations

All findings, both before and since 1920, agree in recommending that all teaching be done by men. Before 1920 it was generally advised that these men have real industrial training in actual shops and that their teaching be for its utility value; that is, the projects would be made because of their actual worth and because they were needed in the homes of the students. Technical skills were stressed, in some cases with the idea in mind, that good habits of work built up in one subject would carry over into other subjects. Most of the surveyors recommend that the shopwork be correlated with other subjects and the projects be used as a means of illustrating some of the principles learned in these other school subjects. In Grand Rapids it was recommended that[1] seventh and eighth grades be "(1) given the fundamentals of a large variety of the world's occupations, and (2) permit the boys to try out in preliminary ways in labors of several fields as one of several factors in choosing a vocation." All surveyors seem to agree, both before and since 1920, that shop courses should be reorganized and the work extended to new industrial fields. They also agree that better supervision is necessary. At Portland it was recommended that[2] "most of the work should consist in the activities of making things."

General recommendations since 1920 upon which most of the surveyors agree were, (1) that the manual training be extended down into the lower grades, (2) do away with exercises and learn the processes on the project, (3) less emphasis upon the technical skills and more on the development of information, habits and appreciations most helpful in everyday problems, (4) allow for individual interests of pupils, (5) give more attention to the thought side, and (6) objectives more clearly defined. Atlanta recommended[3] "that more emphasis be placed on selected readings." Philadelphia advised[4], "that the graduation requirements be modified to allow the pupils taking the industrial course to graduate on the same basis as those taking the other courses."

Trends

In these surveys from 1912 to 1927 there seems to be distinct trends or changes of opinion as to what

[1] *Grand Rapids, Michigan, Survey*, Charles Judd, 1916, p. 203.

[2] *Portland, Oregon, Survey*, E. P. Cubberly, 1915, p. 230.

[3] *Atlanta, Georgia, Survey*, Strayer, 1921, p. 241.

[4] *Philadelphia, Pennsylvania, Survey*, State Department of Public Instruction, 1922, p. 227.

constitutes a good course of study and efficient teaching. The earlier surveys stressed the vocational trend which was away from the older idea of exercises. People wanted to substitute utility value for that of a series of models. Technical skills were advocated and actual training in the industry was recommended as the best training for teachers. In the later surveys we find fewer recommendations in industrial education than in those before 1920, but such as are included, are of a more definite nature in their suggestions. In Appleton, Wisconsin, it is recommended that unit courses be developed in general shops. In the Racine survey are found such specific recommendations as the uniformity of time devoted, the average number in class, and that each teacher be given one free hour during the school day.

Since 1920 the trend is definitely toward more content value of the subject itself. This content is to be brought in from a great variety of industries which offer a rich selection of material. The aim is to be a more general education as opposed to that of the old apprentice idea or the vocational training of several years ago. Not that vocational training is not needed and recommended. It is, but it is recommended in connection with the industry in which the student has definitely made up his mind to try to earn his living. Still another, and the newest trend, is toward the organization of general shops in which several units of work are conducted in the same room and by one teacher. These units are not to be vocational in nature but to have content value just as valuable for general knowledge as the content of history or mathematics. It will include a great deal of selected reading materials about the various industries and the projects made will be used as laboratory experiments to test out the theories just as in physics or chemistry. This content will include a body of knowledge which will better fit the student to live in our present highly organized mechanical age and to take advantage of its opportunities.

The Maintenance Club

*Wilbur M. Merrill**

OUR years ago the Falmouth Junior High School Maintenance Club was organized. The purposes of the club were explained, and boys interested in it were asked to report on a certain date. The result was very gratifying, as 43 boys were present at the organization meeting. The purpose of the club was definitely outlined. Officers were nominated and elected. The president appointed a rules committee to draw up rules and report at the next meeting.

At the next meeting the following rules were adopted:

1. The name of this club shall be The Falmouth Junior High School Maintenance Club.

2. The purpose of this club shall be to keep the building and equipment in good repair.

3. All teachers are to be approached in order to find out their needs. The club members are then to work toward fulfilling these needs as far as possible.

4. The president shall appoint two boys from each room to serve as inspectors for one month. The duty of these inspectors shall be:

a) To make a weekly inspection of their room and part of the corridor adjoining their room and to turn in a written report on a form furnished them for that purpose.

b) To be always on the watch for any destructive boys and to report any or all who are seen defacing the building or injuring the surroundings in any way.

These rules made a good foundation on which to start. Inspectors were appointed, and report forms were prepared on the ditto machine. The immediate result was that the boys took more pride in the building, and their sense of responsibility grew, as they realized that they were really a part of the workings of the school.

Soon the jobs that were assigned to the club grew harder, until some were too much for junior-high boys. These difficult jobs were then reported to the senior-high boys and were made a part of their shop course.

The jobs completed by the club quickly showed an estimated saving of over a hundred dollars. The usual jobs consisted of repairing flat-iron cords and electrical appliances, cutting legs off chairs for the smaller girls in sewing, cleaning sewing machines, regluing commercial desks, etc.

Two of our largest jobs were sheathing one end of the gymnasium wall and moving and overhauling four woodworking machines.

Our manual-training room was in the junior high school, and across the school grounds in the high-school basement was a 36-in. band saw, a 16-in. single-surface planer, an 11-in. wood lathe, and a 12-in. machine lathe. They were all covered with dust, as they had been lying idle for five years. After consulting with the superintendent, they were moved to the room in the junior high school which was originally intended for the shop.

Using pieces of large pipe for rollers, the heavy machines were easily moved across the grounds to the place where they were to do duty.

The cleaning, overhauling, aligning, painting, guarding, etc., all followed, and in 23 days after the job was started every machine was tested and ready for use. The machines have done much in broadening the scope of our shopwork. We not only make repairs now, but we also make new equipment.

During the year we built one classroom for a special class in manual training, put up a one-rail fence along one side of the athletic field, and did numerous other jobs.

The size of manual-training and shop classes have increased so that there is no time for meetings but our Maintenance Club still functions.

*Manual-Training and Shop Teacher, Falmouth, Massachusetts.

EDUCATION

No matter what the vocation, an education is valuable. Bigger and better opportunities present themselves to the man with an education. Efficiency comes as a result of education. — *S. P. Eisenhour.*

© 1939, The Bruce Publishing Co.
To be published or reproduced for School Shop Use Only

No.	Part	Mat'l
1	Cross Slide Base	C.I.
2	" " Screw	Steel
3	" " Nut	Brass
4	" " Gib	Steel
5	" " Thrust Ring	"
6	" " Thrust Post Nut	"
7	" " Thrust Post	"
8	Set Screws for Gib	Steel
9	" " Tool Post Screw	"
10	" " Tool Post Stud	Steel
11	" " Tool Post Screw Nuts	"
12	" " Clamp	"
13	" " Handle	"
14	" " Feed Shaft	"
15	" " Pinion	"
16	" " Gear	"
17	Flat Head Mach. Screws	"
18	" "	"
19	Screw Feed Dial Set	Brass

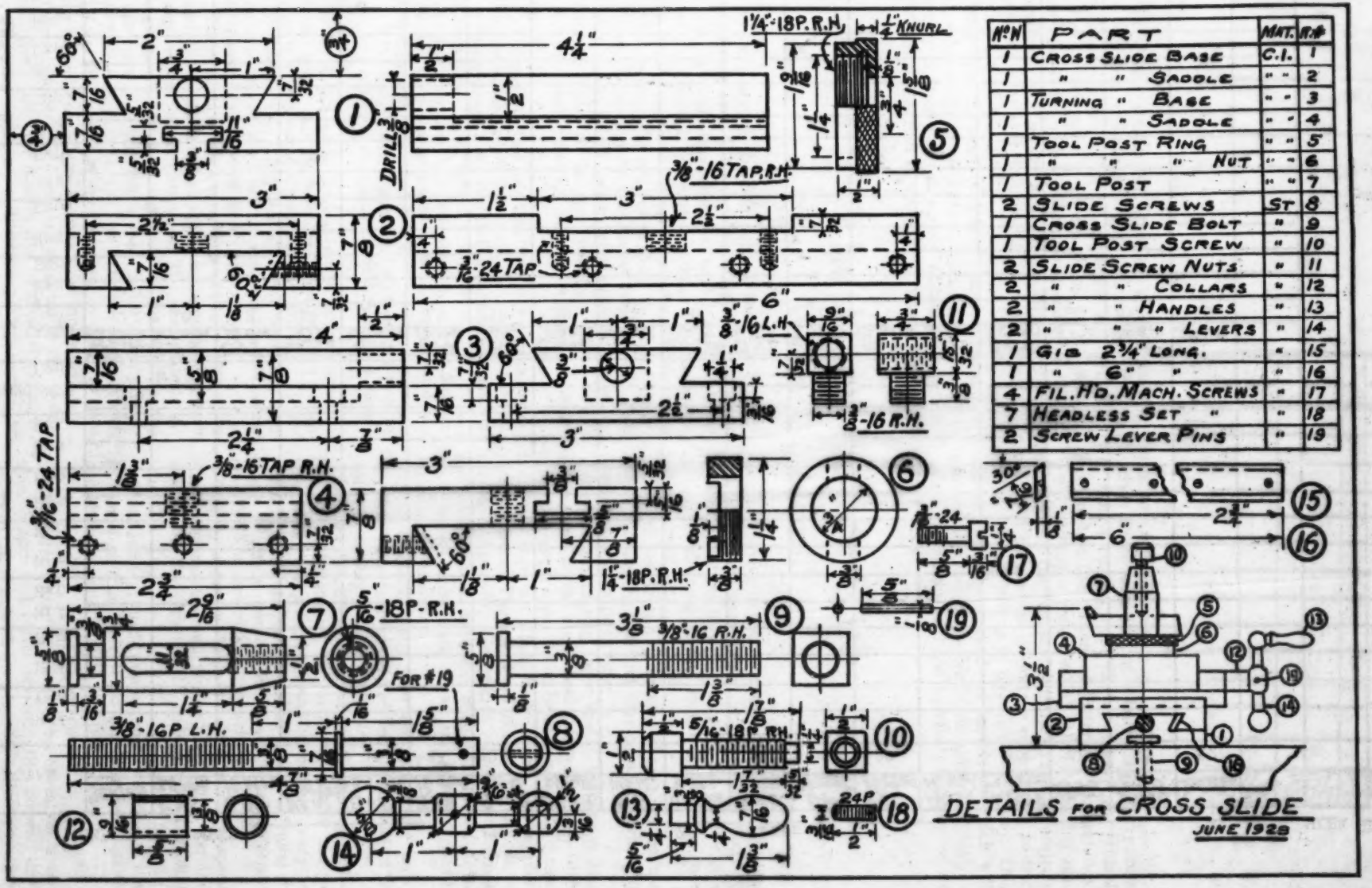
DETAILS for CROSS SLIDE
Base Unit

Designed by Chester Elliston, Milwaukee, Wisconsin

For Description See Page 365

Industrial Arts and Vocational Education, July, 1939

To be blueprinted or mimeographed for School Shop Use Only
© 1930, The Bruce Publishing Co.



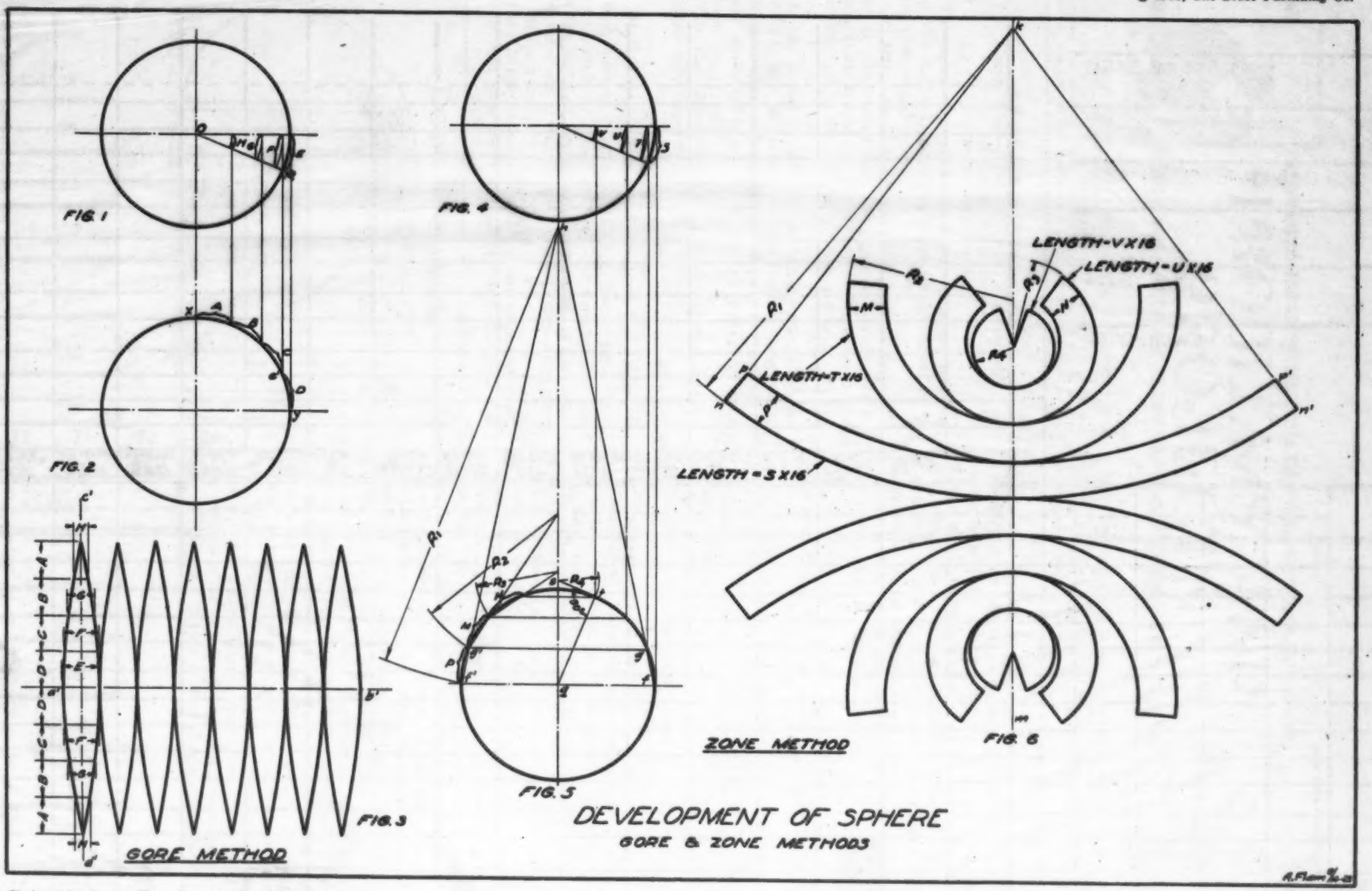
No. N	PART	MAT.	R.#
1	CROSS SLIDE BASE	C.I.	1
1	" " SADDLE	"	2
1	TURNING " BASE	"	3
1	" " SADDLE	"	4
1	TOOL POST RING	"	5
1	" " " NUT	"	6
1	TOOL POST	"	7
2	SLIDE SCREWS	ST	8
1	CROSS SLIDE BOLT	"	9
1	TOOL POST SCREW	"	10
2	SLIDE SCREW NUTS	"	11
2	" " COLLARS	"	12
2	" " HANDLES	"	13
2	" " " LEVERS	"	14
1	GIB 2¾" LONG.	"	15
1	" 6" "	"	16
4	FIL. HD. MACH. SCREWS	"	17
7	HEADLESS SET "	"	18
2	SCREW LEVER PINS	"	19

Designed by George Elleson, Milwaukee, Wisconsin

For Description See Page 265, Industrial Arts and Vocational Education, July, 1930

TRACING SUPPLEMENT No. 183,
INDUSTRIAL ARTS AND VOCATIONAL EDUCATION,
JULY, 1930

To be blueprinted or mimeographed for School Shop Use Only
© 1930, The Bruce Publishing Co.



Designed by August Flam, Los Angeles, California

For Description See Page 265, Industrial Arts and Vocational Education, July, 1930

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts and Vocational Education. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

DETAILS FOR CROSS SLIDE

George Elleson, Boys' Technical High School, Milwaukee, Wisconsin

(See Supplement No. 182)

The present-day tendency for having trade drafting correlate with shopwork, prompts me to submit the drawing of the cross slide details.

This project meets the foregoing ideal, both for the pattern shop and the machine shop. The pupils make a complete detail drawing, and an assembly drawing of this project. These are then used in the pattern-shop class and in the machine shop.

In this project a variety of machine-shop operations are involved, such as planing, drilling, tapping, filing, thread cutting, scraping, and assembling. All parts are "finished all over," except the ¾-in. slot for the slide screw, which may remain just as cast.

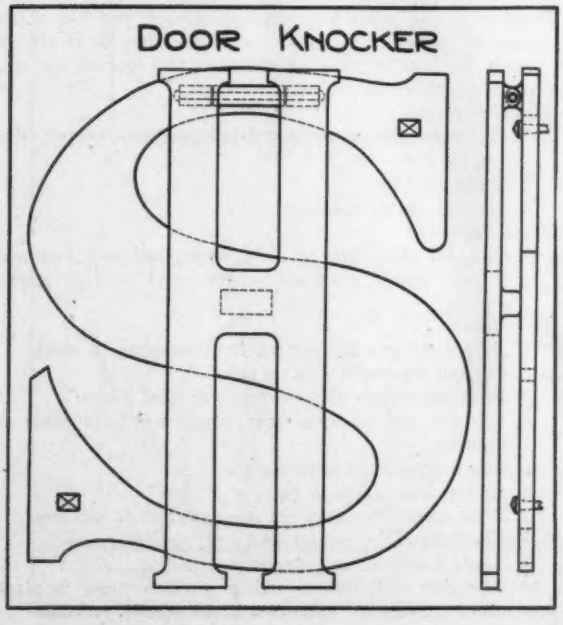
This cross slide is suitable for a speed lathe measuring 3½ in. from lathe center to top of bed.

DOOR KNOCKER

H. G. Stintsman, High School, Bridgeton, New Jersey

Door knockers are again a part of the modern home. They may be made of brass, cast iron, and wrought iron. The knocker described herewith uses the owner's initials as a basis for design. It may be found quite difficult to adopt some initials for a knocker.

The S in the design shown, was forged to shape and butted on the ends from round iron before it was flattened. The projection on the cross part of the H strikes on the middle of the S. The top support has a small hole drilled through it in order to hold the H. A thin brass nail is passed through this hole and corresponding holes on the H, and then riveted over at the one end. The H was sawed out. A hole was drilled at each end of the S for bolts or forged square-headed nails. Carriage bolts can be forged to a square head.



Shops that have forging equipment should find this problem useful for practice and designing purposes.

DEVELOPMENT OF SPHERE

August Flam, Manual-Arts High School, Los Angeles, California

(See Supplement No. 183)

Both the school sheet-metal shop and drafting room can utilize the problem of sphere development to advantage. When analyzed and explained in simple terms, it does not present any special difficulties, and pupils invariably enjoy it far more than they do the average school problem. In addition, cardboard models can be made of the spheres in the drafting class, and a comparison of the relative values of the methods employed discussed and evaluated.

1. *Gore Method.* The word "gore" means segment, sector, or slice, as of an orange. If we can imagine the skin of an orange being removed in such a manner that each of the slices or gores retains its own characteristic shape, and all of the single gores are joined on a common center line, the result would be as shown in Figure 3.

To construct such an enveloping surface or development, two views of any size sphere as shown on Figures 1 and 2 are required. The sphere may be divided into any convenient number of equal slices or gores. In Figure 1 the sphere is supposed to be divided into 16 equal parts, and the radial line OR sets off, with the horizontal center line, one of the gores. The development of a single gore is all that is necessary, as all of the gores are alike. If a single gore is developed, it can be copied as shown on Figure 3. Referring to Figures 1 and 2, it is obvious that the total height of the development of the gore will be twice the length of the arc distance from the point x to the point y, Figure 2. This arc should be divided into any convenient number of parts; in this example into four. From y, Figure 2, a line should be projected to the horizontal center line of Figure 1 above. The greatest width of the gore along the center of the sphere will then be equal to the arc distance E, Figure. 1. On the horizontal center line $a'b'$, Figure 3, one half the arc distance E (taken from Figure 1) is laid off on each side of the vertical center line $c'd'$. The distance D, Figure 2, is next laid off on $c'd'$, both above and below center line $a'b'$, as shown in Figure 3. The width of the gore at this distance from the center line is found by projecting the point e', Figure 2, to the horizontal center line of Figure 1 and drawing arc F, Figure 1, with radius from point O as center. This distance F is then laid off as shown in Figure 3 at distance D from the center line $a'b'$. In the same way distances C, B, and A, Figure 2, are laid off on $c'd'$, Figure 3, and the widths of the gore at these distances from

a'b' which are respectively arc lengths G, H, and 0 in Figure 1, are transferred to Figure 3 as shown. A smooth curved line connecting the points found in Figure 3 results in the development of a single gore.

If it is desired to construct a hollow sphere of sheet metal or cardboard, the other gores should be copied as carefully as possible from the one first constructed. It is obvious that the greater the number of divisions into which the quarter circle A, B, C, D, Figure 2, is divided, and the smaller the size of each gore is made, the more accurate the development will be.

2. *Zone Method.* This method assumes that narrow strips formed into thin frustrums of cones can be made to envelop the sphere completely.

Figures 4 and 5 show two views of a sphere, with Figure 5 divided into four zones. From points *f* and *g*, Figure 5, lines are projected to intersect the horizontal center line of the view in Figure 4. Through *fg* and *f'g'*, Figure 5, lines are drawn to intersect on the vertical center line at point *h*. With R_1 Figure 5, as a radius, an arc of indefinite length is drawn, as shown in Figure 6. Using the same center, a concentric arc is drawn, the radius being made equal to R_1 less the straight distance P from Figure 5, as shown. On the larger of these arcs just constructed with radius R_1, and on either side of the vertical center line *km*, the length S (Fig. 4) is laid off eight times if the total circumference is divided into sixteen equal spaces. Radial lines through *np* and *n'p'* determine the extremities of the zones. Similarly, R_2 and R_3 minus M, Figure 5, are used to construct arcs of Figure 6, and distance T, Figure 4, is laid off again sixteen times on the larger arc. In the same way any number of zones may be constructed. For the topmost zone, or rather cap, radial line *qt*, Figure 5, is drawn. Next the tangent *ts* is constructed and using the radius R_4, Figure 5, an arc of indefinite length is drawn, as shown in Figure 6. On this arc, the distance V, Figure 4, is laid off sixteen times, as in the case of the other zones. From the extremities of the arc in Figure 6, radial lines will determine the limits of this cap. The bottom half of Figure 6 is the same as the top half.

The accuracy of this development depends upon how narrow the zones are assumed.

SOLDERING SUGGESTIONS

R. C. Roe, Toledo, Ohio

1. A soldering copper should be well tinned and clean before attempting to solder.
2. Be sure the soldering copper is hot enough to melt the solder readily in order to insure a smooth soldered joint.
3. A clean rag should be handy to wipe the soldering copper clean just before attempting to solder.
4. The two pieces of metal should fit close together before soldering.
5. After the soldering copper is well tinned, pick up a drop of solder with the point of the copper and place the point of the copper on the edge to be joined and draw the copper *slowly* toward you. It is important that the copper be drawn slowly in order to heat the metal.
6. The two pieces of metal should be held rigidly until the solder changes from the liquid state to the solid state.
7. Do not rub the soldering copper back and forth rapidly over the joint or it will leave a rough job.
8. Any metal that is to be soldered should be free from grease, paint and rust.
9. A slab of marble, a piece of slate, or a piece of boiler plate is nice upon which to do your soldering. It will save the top of the bench and solder that drops from the joints can be picked up and used.
10. Do not overheat soldering coppers because they will pit and scale off.
11. Do not allow soldering coppers to remain in a hot fire when you do not expect to use them for some time.
12. A blue flame is a hot clean flame. Check the air mixture when the flame is yellow in your gas furnace. Check for dirt in the gas jet.
13. Clean the gas furnace often.
14. Hold the soldering copper beneath wire joints and apply the solder from the top. The copper wire in the joint must be heated to the melting point of the solder before you will get the solder to flow.
15. Long joints are sometimes hard to solder because they are hard to hold in position for soldering. Tack the joint with solder at short intervals and then go back and solder between the tacks.

A MORE VALUABLE NOTEBOOK

Leslie J. Nutting, Beverly Trade School, Beverly, Massachusetts

A notebook or a scrapbook is practically invaluable to the vocational or manual-training instructor. Although the value of clippings and articles taken from the various trade and educational journals is never questioned, many instructors fail to keep them in usable form. Too frequently an instructor wastes considerable time searching through an accumulation of loose clippings.

In order to receive the maximum benefit from these articles, each should be firmly pasted on a full-size notebook page or on a page of the scrapbook and indexed as entered. An obstacle, which at first might be a hindrance, is the fact that many articles are printed on both sides of the same sheet. This may be easily overcome by the following method:

Cut a panel or window in the note- or scrapbook page about ⅛ in. larger than the type matter on the printed page. Apply paste to the margins of the printed page and insert it in place on the remaining "frame" of the notebook page.

The foregoing method makes it possible to read both sides and enables you to have the article always accessible. For a notebook of the loose-leaf type, be sure that all mountings are made on a heavy bond or ledger paper which will withstand the extra handling a notebook gets. Ordinary composition paper is not suitable.

The results of such a system of mounting, together with a "live" index of clippings, will more than repay any instructor for the time it takes to develop it.

AN INSTRUCTION SHEET FOR THE SHEET-METAL SHOP

O. C. Nelson, Oshkosh State Teachers College, Oshkosh, Wisconsin

Job: To make a continuous scratch pad.

Purpose of the job: A continuous scratch pad has many uses in the home, at school, or in the office. It is always ready for you to make notations on and tear off the slip on which they are made.

Materials needed:

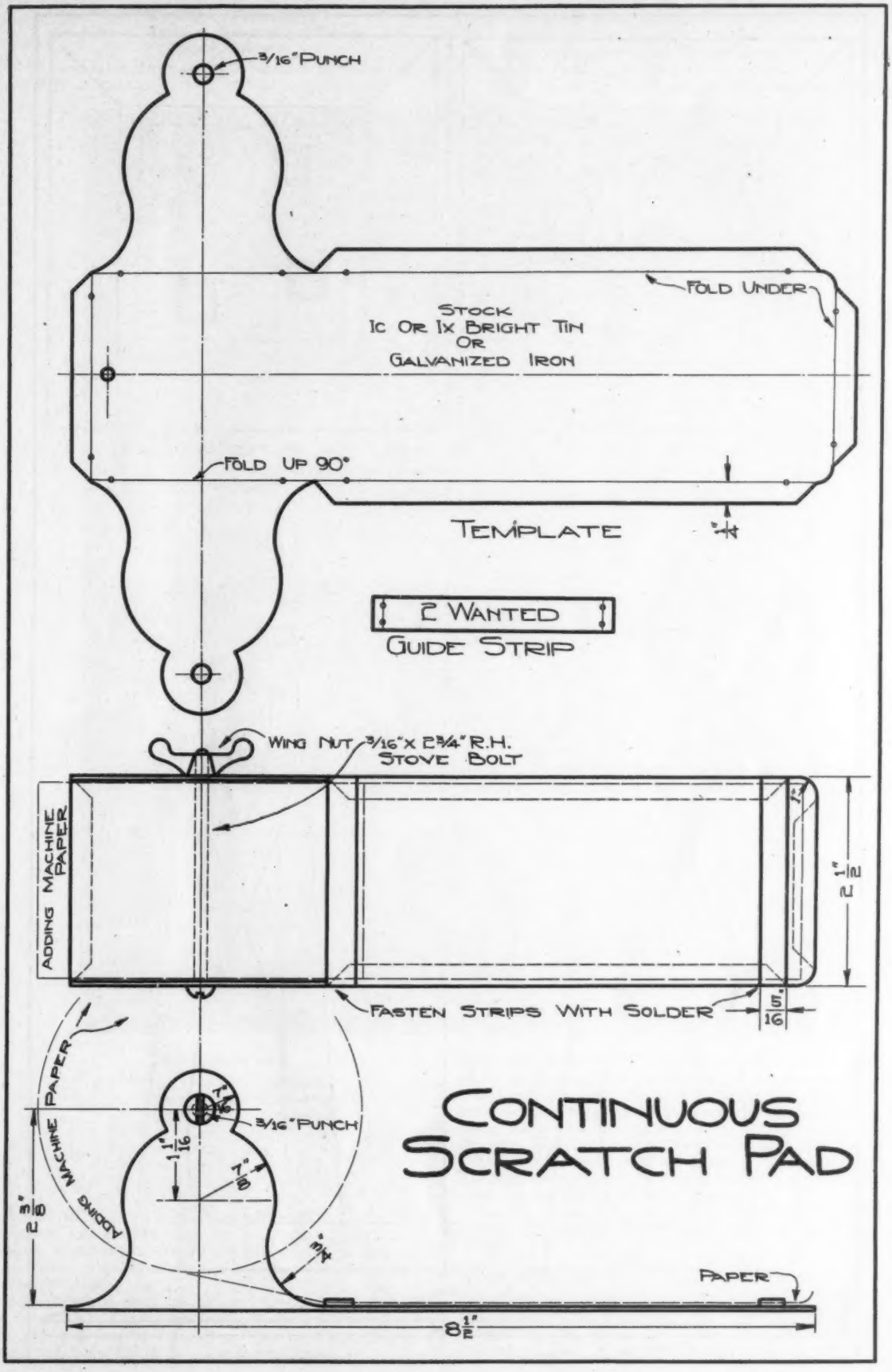
1. IX bright tin or galvanized iron, or sheet copper, size 7¾ by 9 in.
2. Solder and flux.
3. Lacquer, paint, or enamel.

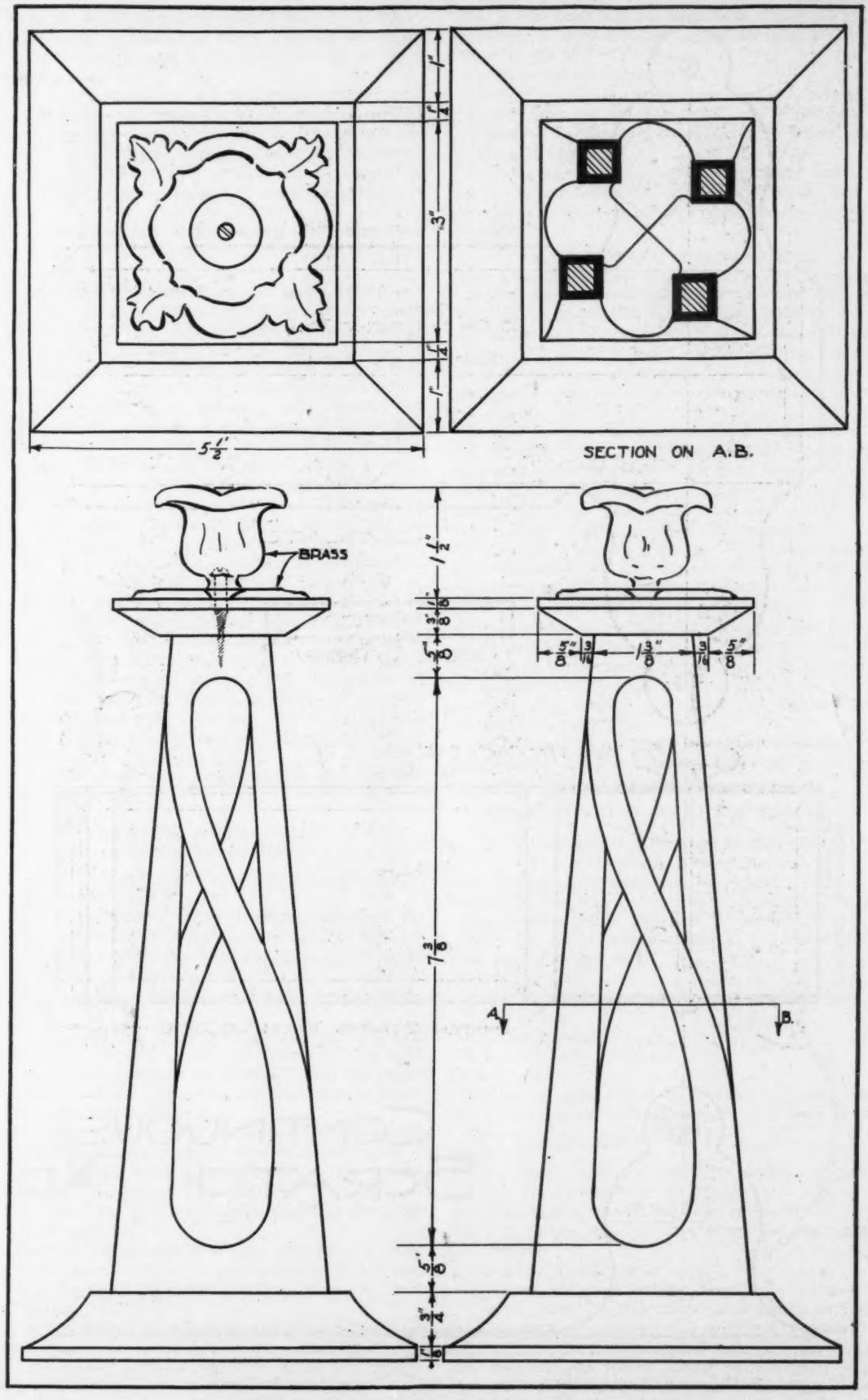
Tools Required:

Scriber, tin snips, bar or hand folder, ball-peen hammer, 3/16-in. punch, soldering copper, steel wool or emery paper.

Procedure:

1. Accurately transfer pattern from template to stock.
2. Cut out the blank with tin snips.
3. Bend edges down with bar folder or hand folder.
4. Lay out and cut two cross straps and bend edges as indicated.
5. Punch three holes as indicated.
6. Solder cross straps to base.
7. Bend uprights so they are perpendicular to the base.
8. Clean the entire project with steel wool or emery.
9. Apply finish. (Paint, lacquer, enamel).
10. Assemble with roll of adding machine paper in place and 3-in. carriage bolt with thumb screw.


3/16" PUNCH
FOLD UNDER
STOCK
1C OR 1X BRIGHT TIN
OR
GALVANIZED IRON
FOLD UP 90°
TEMPLATE
2 WANTED
GUIDE STRIP
WING NUT 3/16" X 2 3/4" R.H.
STOVE BOLT
ADDING MACHINE PAPER
2 1/2"
FASTEN STRIPS WITH SOLDER
5/16
ADDING MACHINE PAPER
3/16" PUNCH
1 1/16"
7/8"
2 3/8"
PAPER
8 1/2"
CONTINUOUS
SCRATCH PAD

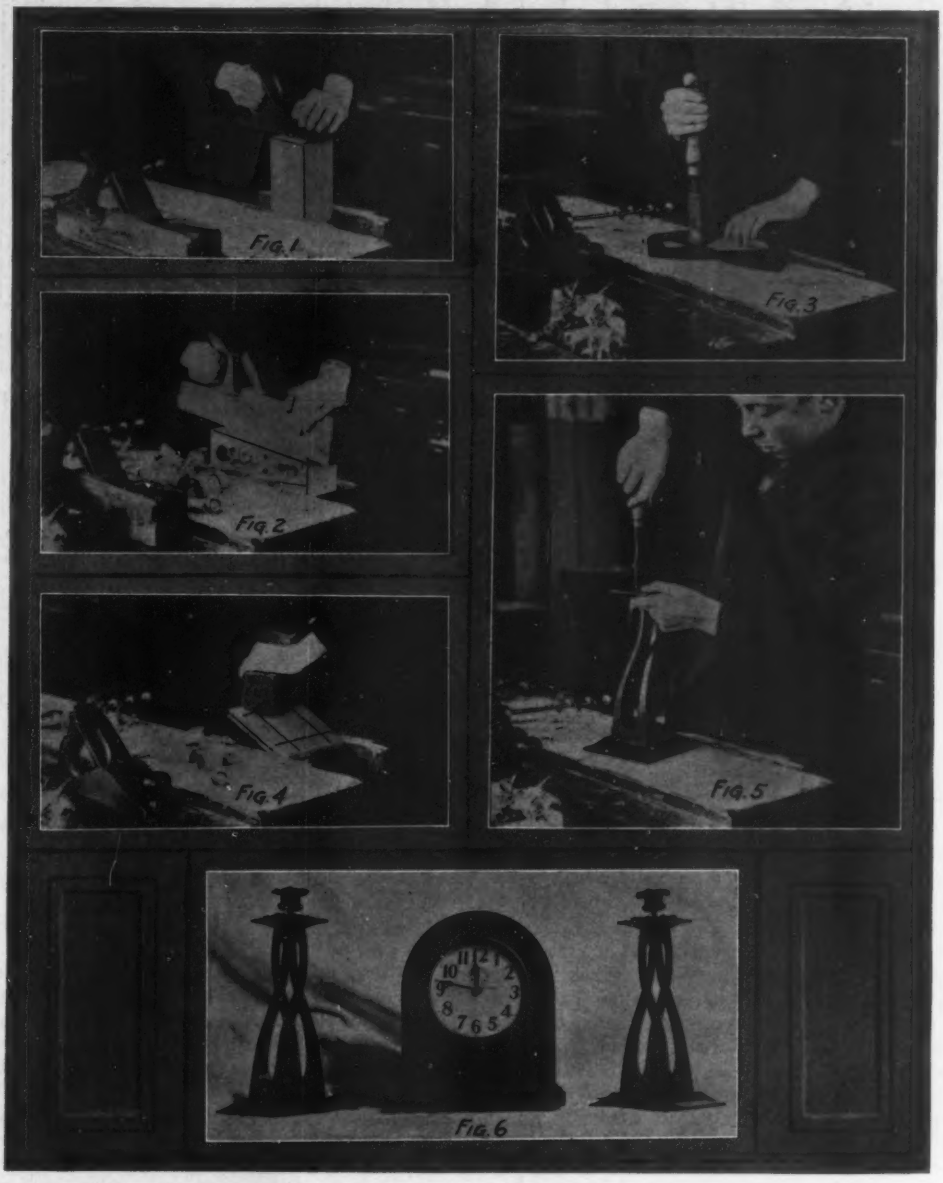


A UNIQUE CANDLESTICK, DESIGNED BY JOHN Y. DUNLOP

A UNIQUE CANDLESTICK

John Y. Dunlop, Greenfield, Tollcross
Glasgow, Scotland

The candlestick shown herewith makes a very nice exercise in boring and paring.



Bill of Materials

1 pc.	3 x 3 x 9	Hardwood
1 pc.	⅞ x 5½ x 5½	Hardwood
1 pc.	½ x 3 x 3	Hardwood
1	Thimble Candle Holder	
1	Brass or Copper Plate	
2	1½-in. r.h. Screws	
2	⅞-in. f.h. Screws	
1	1¼-in. f.h. Screws	

Square up all stock to the dimensions shown in the bill of materials. Lay out the taper on the shaft and draw in the position of the curved ribs on the four sides. The safest plan is to make a template of the shaft similar to the shape shown in the elevation.

After the four sides are laid out, bore out the open part of the pattern. The boring should be done from each face, and need not go past the center. After the boring has been completed, plane the block to the tapered shape.

A template is again used to lay out the ribs on each side of the block. It must be noted, of course, that the template will be a little longer than the one shown in the elevation, since it has to be applied to a sloping surface.

The shape of the ribs is next cut out, working from each face down to the middle. The paring should all be done as shown in Figure 3. The top and bottom pieces are each to be chamfered as shown; the hollow chamfer on the base piece being put on with a gouge. Sandpaper the three parts of the model and attach the base and upper part with screws. Give the joints a touch of glue to insure that they are well bedded.

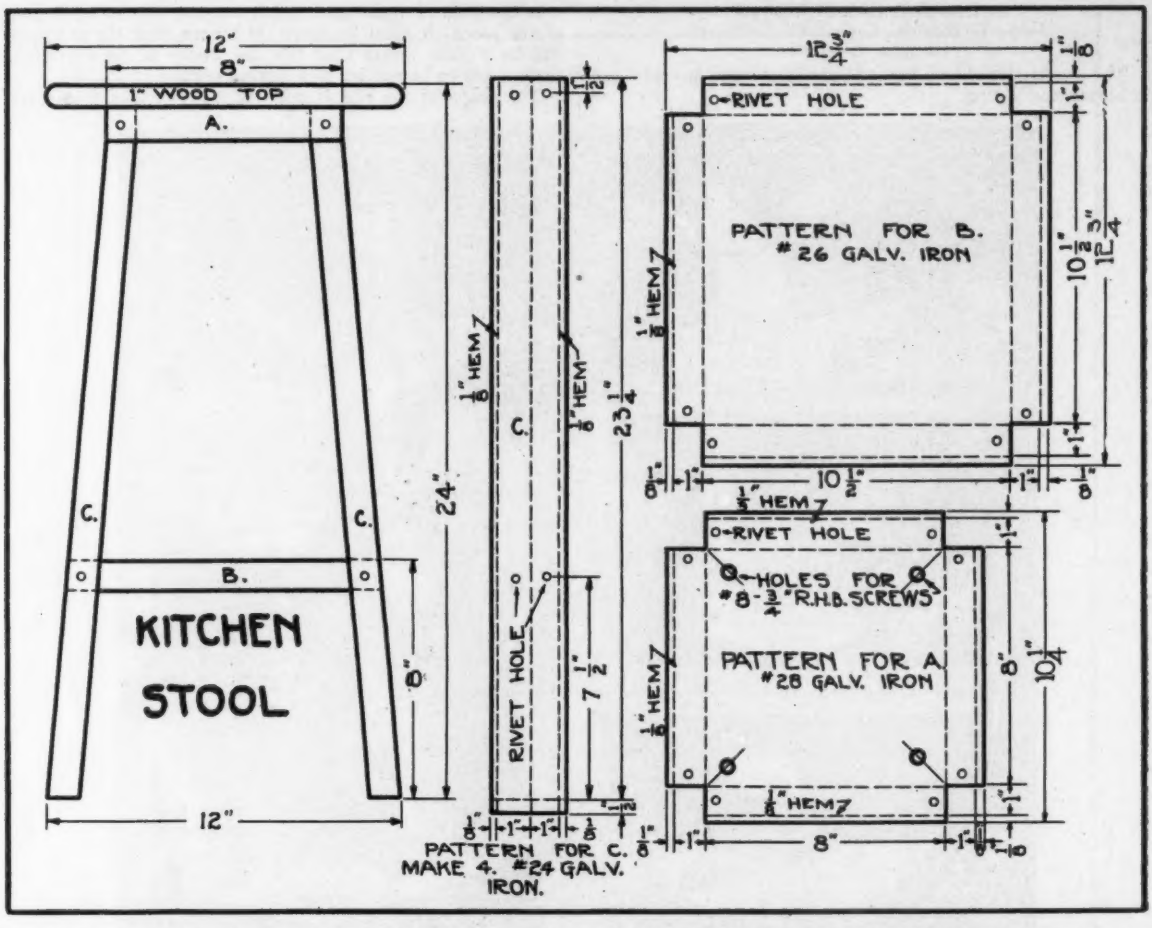
The cup for the candle can be made of brass or copper. The plate on which the cup rests should be of a size to almost cover the top surface of the candlestick.

The candle cup and plate are attached to the wood part by a screw. The candlestick may be finished as the maker sees fit.

KITCHEN STOOL

Edward Stein, Adjustment School No. 50, Buffalo, New York

A combination sheet-metal-and-wood project that can be used in the home for mother's use in the kitchen, or in the school shop for use at the benches, has been designed to solve the problem of the fast boy who is ahead of the rest of



the class in his work and has finished the prescribed course of projects. The project also may be given to the boy who is nearing the end of the term in a sheet-metal course and is going into the woodshop the following term where he can make the seat for the stool.

The stool makes an excellent review project for the sheet-metal student, as it covers laying out work, folding, locating rivet holes, assembling, riveting, and soldering. The woodwork in this project requires the proper selection of wood, planing, gluing, turning on the lathe, and finishing.

The metal top A is used as a base to which is fastened the seat. This is laid out first using No. 28 galvanized iron. Laps are not necessary on the corner. Pattern B is made of No. 26 galvanized iron. It acts as a stiffener to keep the stool from wobbling.

The legs C are made of No. 24 galvanized iron and have been found as serviceable as angle iron with the added advantage of being much lighter in weight. The pattern of the legs are slit up ½ in. on the center line. The ⅛-in. hem is formed first and then the sides are formed at right angles to each other in the brake. The ½ in. at the bottom is bent over on the inside of the leg at right angles to the bottom and the overlapping edge is soldered. The solder is used to prevent scratching the floors. Rubber stool tips also may be put on the bottom of the legs.

The shelf B is riveted to the legs first and then the top A is riveted completing the framework. Square and shape the framework keeping the angles on all sides equal. Solder each inside corner of A and B to the legs. Sweat the solder in thoroughly. The stool is then ready for the wood seat. The top is fastened to the framework with No. 8 by ¾-in. r.h. blued screws from the underside. Smooth off all sharp corners and points with a file, and finish with white or green enamel.

Some of these stools have been given hard use in the shop, and are still in perfect condition after four years.

TWIN PUSHER

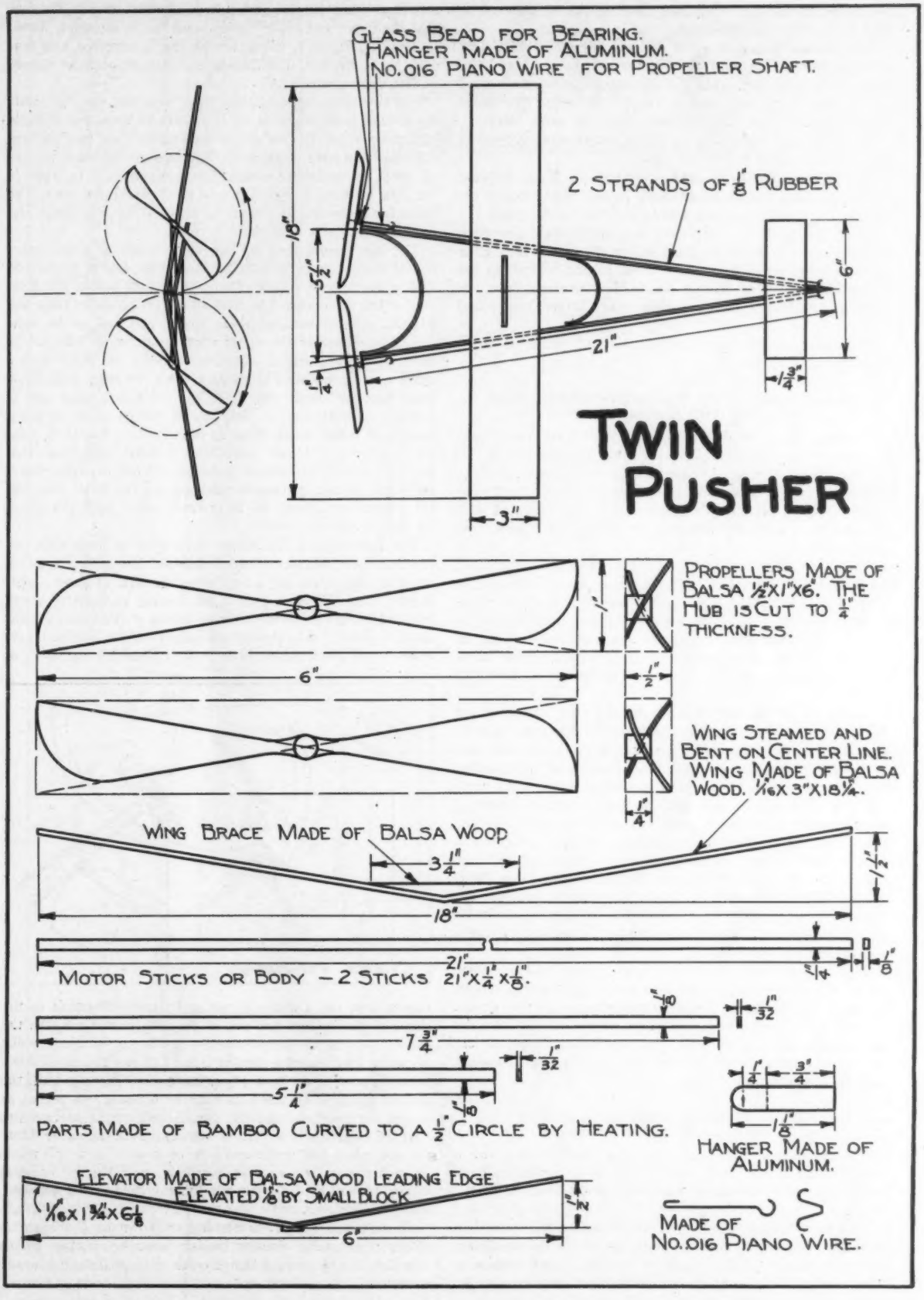
H. C. Stafford, Littleton, Colorado

The twin pusher airplane model described herewith has been used with considerable success in our model airplane club. As this plane is all wood and bamboo, it is not as easily destroyed as a paper covered model. It is not an endurance type, but it will remain in the air for 25 or 30 seconds.

The motor sticks are made of a good quality straight-grained balsa wood 21 by ⅛ by ¼ in. The crosspieces of the frame are made of bamboo bent to half circles by heating around a stovepipe or over a candle flame. They may be fastened to the motor sticks with thread, after which a coat of glue should be applied over the thread wrappings. The propeller hanger and the end brace may be fastened at the same time.

The elevator is bent up so that the two ends are ½ in. higher than the center. This is done by soaking a narrow strip of balsa wood along the center line and then placing the two ends on blocks of wood, after which the center should be weighted down until it touches the table. Allow the strip to dry in this position, and then glue a ⅛-in. block on the underside of the front edge. This will give the plane the proper elevation. When the speed is increased, the front end lifts and the plane commences to climb, then when it slows down the front drops and it will again gain speed. This acts as a balance between the speed and elevation.

The wing is made in the same way as the elevator. While the elevator is fastened in a fixed position, the wing should


GLASS BEAD FOR BEARING.
HANGER MADE OF ALUMINUM.
NO. 016 PIANO WIRE FOR PROPELLER SHAFT.
2 STRANDS OF 1/8" RUBBER
18"
5 1/2"
21"
6"
1/4"
1 3/4"
3"
TWIN PUSHER
PROPELLERS MADE OF BALSA 1/2"X1"X6". THE HUB IS CUT TO 1/4" THICKNESS.
6"
1"
1/2"
1/4"
WING STEAMED AND BENT ON CENTER LINE. WING MADE OF BALSA WOOD. 1/16X 3"X18 1/4".
WING BRACE MADE OF BALSA WOOD
3 1/4"
1 1/2"
18"
21"
1/4"
1/8"
MOTOR STICKS OR BODY – 2 STICKS 21"X1/4"X1/8".
1/10"
1/32"
7 3/4"
5 1/4"
PARTS MADE OF BAMBOO CURVED TO A 1/2" CIRCLE BY HEATING.
1/4"
3/4"
1 1/8"
HANGER MADE OF ALUMINUM.
ELEVATOR MADE OF BALSA WOOD LEADING EDGE ELEVATED 1/8 BY SMALL BLOCK
1/16X1 3/4X6 1/8
1/2"
6"
MADE OF NO. 016 PIANO WIRE.

be fastened by looping rubber bands over the wing and under the motor sticks. The wing may then be moved forward or back to get the proper balance.

The propellers can be made of light, straight, white pine or balsa wood. One must revolve toward the right and the other toward the left. This will overcome the torque caused by one propeller. Care must be taken also to get the blades at the same pitch so they will both exert the same force.

Any stiff steel wire, such as .016 piano wire, may be used for propeller shafts and motor hook.

The motors should be double strands of ⅛-in. airplane rubber or three strands of ordinary rubber bands looped together. The regular airplane rubber will take more turns.

When the plane is completely assembled, slide the wing forward or back until the plane will make a nice long glide to the ground when launched without having wound up the rubber bands. After having adjusted the wing, turn the propellers backward until the rubbers are kinked the second time.

The plane should then take the air and climb 40 or 50 ft. in graceful circles.

TRADE-SCHOOL STUDY SHOWS GRADUATES FOLLOW THEIR TRADE LINES

A recent study of day schools of New York state, conducted by the industrial-education bureau under Mr. R. D. Fleming, shows that nearly three fourths of the 2,060 students graduated in 1929, followed the trades in which they were trained. Of the total number, more than four fifths, or 86.6 per cent, were boys. For the boys, 25 trades were represented, and for girls 6 trades.

The study which embraced a total of 13 cities of the state, comprised the records of 2,000 boys graduated during the past year. This study showed that about two out of three boys entered the trade for which they had been trained in school. The girls showed 100 per cent returns, because of the fact that the girls completing trade-school courses must serve six months in the particular trade before receiving a diploma.

Based on the number of students, the electrical trade led the list, with 766 reported as graduates of the course and 65 per cent following the trade. Automobile mechanics was second, with 276 graduates and three fourths of the number following the trade. Next were the woodworking trades, with 187 graduates and 65 per cent entering the trade. Machine-shop practice was fourth, with 177 graduates and 57.6 per cent of the graduates entering the trade. Painting, which was fifth on the list, had 170 graduates and 92.2 per cent of those entered the trade. Plumbing had 100 graduates and two thirds of the number entered the trade. Commercial art had the poorest showing, with 43 per cent following the trade. Trades paying less than $15 a week numbered 10, as against 15 trades which paid $15 or over.

The courses were two years in length, except in one or two cities, where four-year courses were given. They were arranged to meet the needs of young people who could not devote more than two years to attendance after graduation from the grammar school. The work includes practical trade instruction, as well as work in related subjects such as mathematics, science, drawing, and history.

WROUGHT-IRON UMBRELLA STAND

Gerald A. Boate, Seattle, Washington

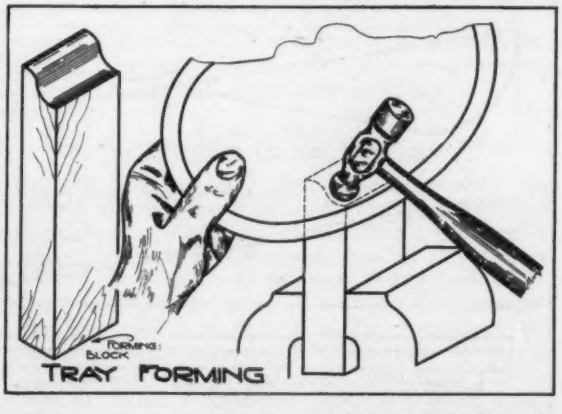
The umbrella and walking-stick stand described herewith is an all-metal holder. It is easily made in a few hours, costs very little, and introduces some hammered-brass or copper work.

The three legs are made of 7/16-in. square mild-steel bar, each leg being cut 29 in. long. The ends for the top scrolls are forged as shown at A^3, Figure 1, and then bent spirally as shown at A^1. The lower curves for the feet are shown at A^2. The twists in the legs are made by heating the metal red-hot and then using the vise and a large monkey wrench. Be sure that the upper and lower curves point in the direction shown in detail A, Figure 1, when the twisting is complete, also that each leg is straight. The drilling and tapping of holes should be left until assembling.

The two rings marked B are made as a pair and the joints lap riveted as shown at detail D of part B. Each ring is made of a piece of ⅛ by 1 by 28-in. band steel. They may be bent cold over the horn of an anvil. The laps are fastened by two ¼ by ½-in. oval-head rivets. The two rings are fastened to the legs with ¼ by ½-in. round-head machine screws. The holes for these screws should be located 120 deg. apart and drilled centrally in each ring.

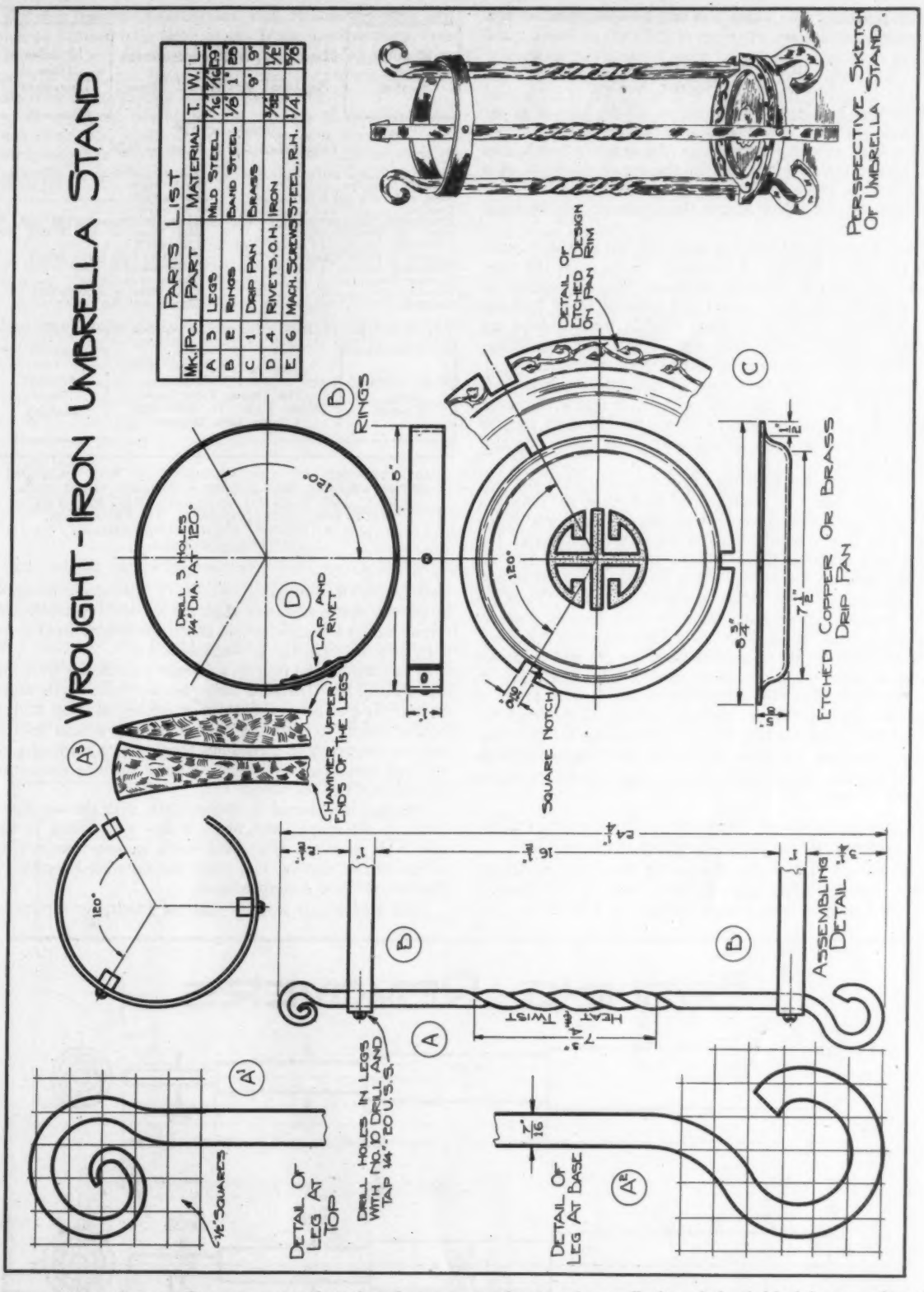
The legs should then be laid on a bench with the upper scrolls facing outward and the three foot scrolls evened up with a 24-in. steel square. Then scribe lines across the inner face of the three legs, 3 in. downward for the upper rings and 3¾ in. upward for the lower rings. This has to be done carefully, otherwise the upper edges of the rings will not be level when the stand is assembled. Locate the holes with a center punch, and drill them with a No. 10 twist drill. They must then be tapped with ¼-in. No. 20 U.S.S. hand tap. If desired, all surfaces but the twisted portion may be peen-hammered before assembling, as shown at A^3, Figure 1, using the ball end of a 1½-lb. machinist's hammer with blows that dent the surface uniformly, being careful not to strike where holes are drilled. In peen-hammering use the anvil face and not a bench top. When the rings are in place, draw the screws up tightly and then *stop*.

The forming and etching of the copper or brass drip pan presents little difficulty. From a sheet of No. 20 U.S.S. gauge brass or copper, cut out a 9-in. diameter disk. If sheet copper is used, heat the piece over a gas furnace or forge to a dull red and plunge in clean water to soften it. For drawing the sheet or dishing it to the form required for the drip pan, take a hardwood block ⅞ by ½ by 8 in. and with a jig, band, or



coping saw, cut a curve at one end that corresponds to the shape of the bottom and rim of the drip pan. Then dish the pan by rotating the copper sheet over this curved block which is rigidly held between vise jaws, and hammer the metal down with the peen of a 12- or 14-oz. machinist's hammer until the desired shape is obtained. It may be necessary to reheat or anneal the sheet several times during the forming operation so that the copper will be soft, or elastic, during the entire drawing operation. Any brittleness is to be avoided as it will result in fractures and cracks. Use only light, well-directed hammer blows. If part of the surface is to be etched, avoid hammering these surfaces.

A suggested design for etching is shown at C, Figure 1. Other appropriate circular borders may be worked up or selected. A large open design is quite appropriate and is easily executed.


WROUGHT-IRON UMBRELLA STAND
PARTS LIST
Mk. Pc. PART MATERIAL T. W. L.
A 3 LEGS MILD STEEL 1/16 1 1/16 29"
B 2 RINGS BAND STEEL 1/8 1" 25
C 1 DRIP PAN BRASS 9" 9"
D 4 RIVETS, O.H. IRON 3/32 1/2"
E 6 MACH. SCREWS STEEL, R.H. 1/4 5/16
PERSPECTIVE SKETCH OF UMBRELLA STAND
DETAIL OF ETCHED DESIGN ON PAN
B RINGS
DRILL 3 HOLES 1/4" DIA. AT 120°
120°
LAP AND RIVET
HAMMER UPPER ENDS OF THE LEGS
SQUARE NOTCH
ETCHED COPPER OR BRASS DRIP PAN
ASSEMBLING DETAIL
HEAT & TWIST
DRILL HOLES IN LEGS WITH NO. 10 DRILL AND TAP 1/4"-20 U.S.S.
DETAIL OF LEG AT TOP
1/2" SQUARES
DETAIL OF LEG AT BASE

These notches shown at C are cut out so that when the pan is tilted it will slide into place just above the lower ring.

Should it not be desired to etch the drip pan with a design, it may be peen-hammered, then brushed with a hot potassium-sulphate solution, and when dry the high spots lightly brushed with fine steel wool. This treatment produces bright spots of copper shining through a very dark background. The entire stand may, when well cleaned, be finished in a number of ways. It may be oiled, varnished, or waxed, or the various brushing lacquers may be used. A rather pleasing effect is produced by brushing the iron parts of the stand with black brushing lacquer and when dry, touching up the rings and twists sparingly with a little gold bronzing powder and clear lacquer. The shadows may then be touched up with green

bronzing powder. The whole also may be spray painted in a three-tone combination.

BUSHING REMOVERS
Lemuel Harris, Nogales, Arizona

Removing bushings from springs or spindle arms is rather a tedious job when it is necessary to cut the bushings in two with a hack saw to remove them. An ordinary punch does not answer the purpose, because the actual thickness of a worn bushing is so small that it is practically impossible to hold the punch in place against the sharp ends of the bushing.

The punches in the drawing were designed as a shop problem covering a number of processes. They are, at the same time, very efficient bushing removers. The set consists of two punches which are turned and soldered to fit bushings ranging from ¼ to ¾ in. They may be used to drive out bushings on the Ford, Chevrolet, Willys Knight, Dodge, Chrysler, Essex, and many other makes of automobiles.

The punches may be turned of old axle or drive-shaft steel. They may be machined without annealing, however, steel of this nature is often extremely hard in spots and the job will be handled more satisfactorily if the steel is annealed before turning.

After the punches have been turned to dimension and polished, they should be casehardened to prevent the shoulders from becoming battered when they are driven against spring eyes, etc. This is accomplished in the following manner: The punches are heated throughout to an even cherry red, removed from the fire and sprinkled thoroughly with powdered potassium cyanide or yellow prussiate of potash. They are then rotated in the powder until the steel assumes a greasy appearance, then replaced in the fire and heated to a dull red. The punches are then removed from the fire and immersed in cold water until completely cooled. The steel may be tested for hardness by attempting to cut it with a file. If the steel appears too soft the process must be repeated.

Potassium cyanide is a poison and must be handled carefully. Breathing the fumes will result in a severe headache, hence the hardening should be done where there is a copious supply of fresh air.

SCHOOLBOYS OF FOREIGN CITIES EXCHANGE IDEAS WITH CHICAGO BOYS ON DRAWING

Schoolboys in 75 cities all over the world have exchanged ideas in architectural and mechanical drawing with students of the Roosevelt High School, Chicago, as a result of a far-reaching plan worked out by Mr. W. G. Hjertstedt, instructor in drawing at the Roosevelt High School. Mr. Hjertstedt conceived the plan two years ago, and single-handed has carried it to its present state of accomplishment.

In establishing the plan of a friendly interchange with foreign schools, Mr. Hjertstedt aimed not only to stir in the minds of students a more vital and deeper interest in these studies, but he sought to establish a more friendly human relation between the youth of all nations, building up a spirit of good will and friendship that would do much to bring about permanent peace of the world.

The plan was started in March, 1928, with the sending of letters to different nations, to see if they were willing to take part in the exchange. After many weeks, answers were received to the letters, showing that many nations were interested in this international correspondence.

Each student was given a separate country or a principal

12 miles from Boston	**Reading, Massachusetts** **An Ideal Residential Town**	12 miles from Lawrence

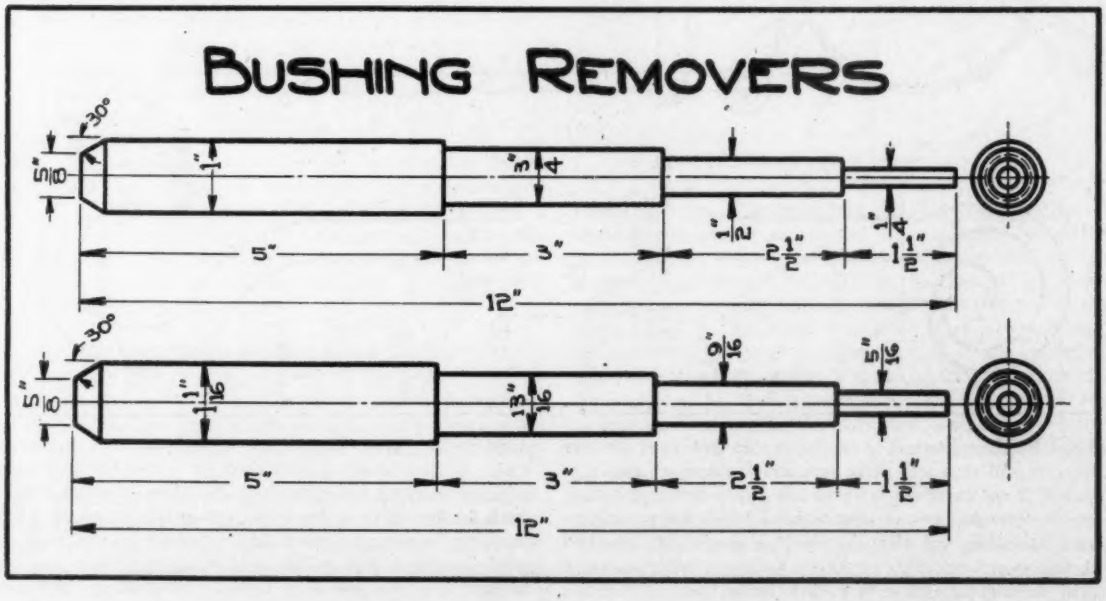
Settled in 1639
Incorporated as a Town in 1644

Population	9,000	Banks	3
Property Valuation	$15,226,119	Bank Assets	$7,358,871
Miles of Streets and Roads	100	Public Parks	2
Dwellings	2,347	Theater	1
Fire Stations (Motorized)	2	Trains arriving or leaving daily	30
Men's and Women's Organisations	25	Main line of the Boston and Maine R.R.	
Volumes in Public Library	15,600	Abundant Pure Water Supply	
Telephones	2,254	A live Board of Trade	
Business Places	150	Modern Golf Course	
Schoolhouses	8	Good Hotel Accommodations	
Churches	7	Electric and Bus Lines	

The first town in Massachusetts to elect a woman selectman.

14 miles from Lowell	Reading is the home of Organ Pipe Builders The Thomas Pratt Clock Ranny Weeks :: Radio Star Judge Jesse Morton	8 miles from Malden

CARD PRINTED BY THE STUDENTS OF THE PRINTING DEPARTMENT OF THE WALTER S. PARKER JUNIOR HIGH SCHOOL, AND DONATED TO THE READING BOARD OF TRADE FOR DISTRIBUTION AT AN EXPOSITION. GEO. R. DRAPER, INSTRUCTOR, READING, MASSACHUSETTS



city in a country to correspond with, because the work could not be handled by a small group. While in some cases, drawings were sent to countries from which no actual drawings were received, yet all of these countries gave assurance that they would reciprocate as soon as possible.

The exchange has helped the students of Roosevelt High School greatly. When all the drawings have been received, a comprehensive world-wide display will be made to show the splendid work which has been done by other nations.

PENCIL AND LETTER HOLDER

A. M. Mercker, Chaddock Boys' School, Quincy, Illinois

The pencil and letter holder was designed to meet the needs of beginning boys. The project has met with more than usual success. The boys can and want to make it.

The stock should be basswood or poplar. Cut the pieces to over-all dimensions for the pupil, and have him make the layout in pencil on each piece so that it can be carefully checked before toolwork is started.

The decoration can be cut into the wood with a veining tool, or it can be painted on with lacquer, Decalcomania transfers also may be used.

To finish, lacquer in colors to suit the wishes of the individual pupil.

CORRELATING SHOP AND ACADEMIC WORK*

Leon H. Baxter and James S. Levering, Western Reserve Academy, Hudson, Ohio

Geometry and the Shop

In planning the plane-geometry course, we determined to bring into the classroom as many real-life problems and experiences as time would permit. The class, composed entirely of boys, was appealed to for suggestions. The first indication that they took the appeal seriously came in the shape of a miniature billiard table, which one of the students brought to the recitation room. The boy had found it difficult to make a bank shot on the pool table. Knowing it to be a problem of angle reflection, he sought the aid of the shop in constructing the miniature table shown in Figure 1 and presented it with his problem to the class in geometry for enlightenment. The interest in this piece of work by the boys was most gratifying and led to many more similar problems, wherein the shop played an important part, not only in teaching the boy the use of various tools, but in giving to the class working models of their life problems. Figures 1, 2, 3, and 4 show four of these models constructed in the shop and used in the classroom to simplify the problems which they represent.

Figure 1 illustrates the problem: To find a point on the cushion where the cue ball should strike in order to rebound and strike the ball N.

By means of chalk rubbed on small marbles or ball bearings, the trace of the course of the cue ball is left on cloth of the miniature pool table.

By erecting a perpendicular to the cushion at point P, the angles i and r are found to be equal. The angles may be measured with a protractor which also may be made in the shop.

In the diagram shown in Figure X, line MX is prolonged its own length to W. By joining points W and N a point P is established where WN cuts AB. This is the required point of impact against the cushion of the pool table.

It was also proved that line MP plus PN was the shortest path from point M to line AB and thence to point N.

Figure 2 illustrates the problem: To find the distance between points A and B which are obstructed by the house.

Take C any point in front of the house. (See Fig. 2.) Next, run a line from A to point C and from B to C. Find the midpoint points of these lines, X and Y respectively.

Draw line XY and measure its length.

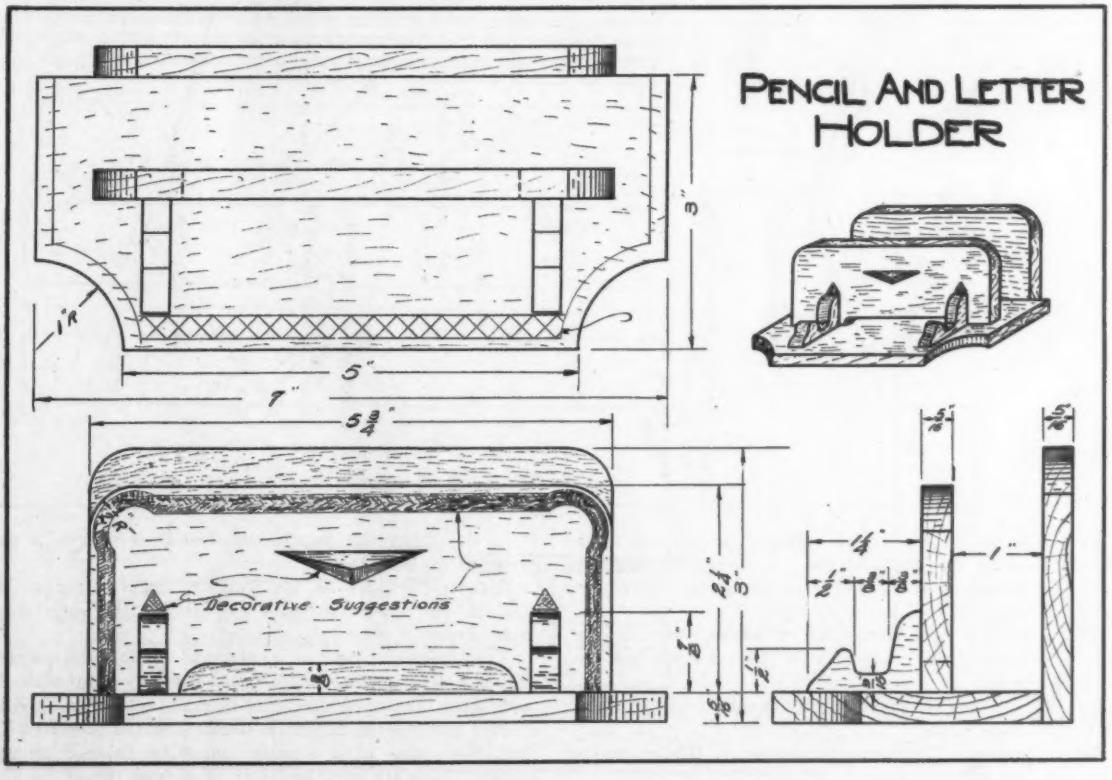
By doubling this distance we have distance AB.

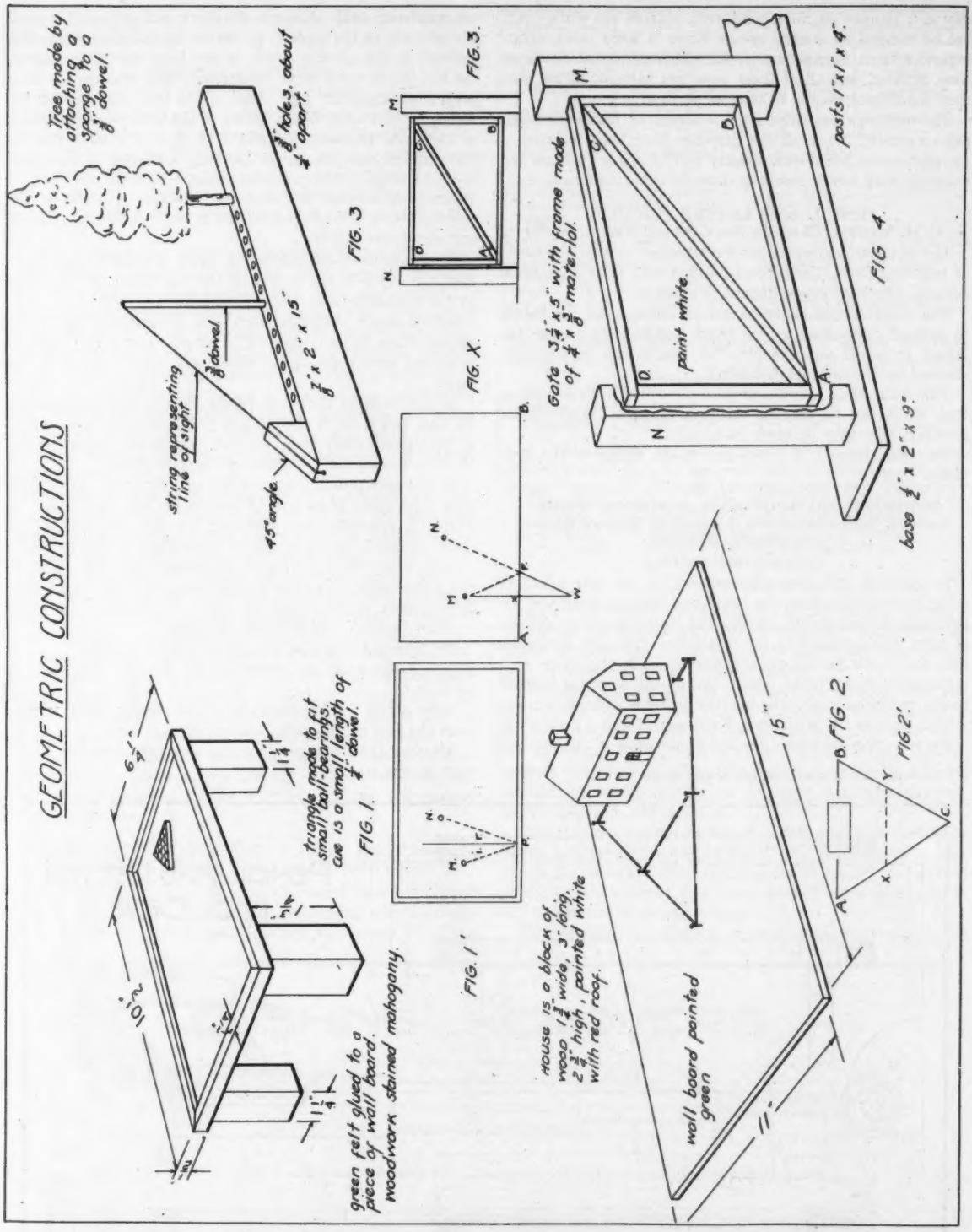
Figure 3 illustrates the problem: To measure the height of an object.

Sight along the hypothenuse of the 45-deg. right triangle until the line of the sight touches the tree top.

Measure the distance from the observer's location to the foot of the tree.

*This is the first of a series of four articles on this subject.




GEOMETRIC CONSTRUCTIONS
Tree made by attaching a sponge to a ¾" dowel.
¾" holes, about 4" apart.
1" x 2" x 15"
¾" dowel
string representing line of sight
45° angle
FIG. 3
FIG. X.
FIG. 1
FIG. 1'
triangle made to fit small ball-bearings. Use 13 a small length of ¾" dowel.
green felt glued to a piece of wall board.
woodwork stained mahogany.
Gate 3½" x 5" with frame made of ¾" x ¾" material.
paint white.
posts 1" x 1" x 4"
base ¾" x 2" x 9"
FIG 4.
FIG. 2.
FIG 2'
house is a block of wood 1¾" wide, 3" long, 2¾" high, painted white with red roof.
wall board painted green
15"
11"

By the principle of a 45-deg. triangle the distance to the tree is equal to the height of the tree above the observer's eye. Add the height of the eye above the ground to this and the total height of the tree is obtained.

The heights of actual trees, water towers, flagstaffs, etc., were measured by this method, after the miniature had been studied in class.

Figure 4 illustrates the problem: To demonstrate the rigidity of a three-sided figure.

Most engineering problems are based on this method of triangulation.

In this figure the parallegram ABCD is used as a gate, mounted on post M.

Without the brace AC the gate was found to sag, striking post N, but when the brace was inserted the gate became rigid. Figure 3, shows the diagram.

This figure is used as a practical lesson demonstrating the fact that a three-sided figure becomes rigid while one with more than three sides may be made to change its shape.

This principle of rigidity is founded on the geometric fact that the angles of a triangle cannot be changed unless a change is also made in the length of at least one of the sides.

A HANDY CLOTHES RACK

Frank L. Wade, Brewster Vocational School, Tampa, Florida

This project utilizes small pieces and edges of lumber which might otherwise go into the scrap pile. At the same time, it forms a very useful article for the household. When the clothes rack is folded it occupies a space of the wall only 7½ by 36 in., and projects only 1½ in. When open, however, it presents the equivalent to 30 ft. of clothesline.

Detail drawings are shown for each piece which is at all unusual. The greatest care must be taken in boring the holes shown in the different pieces. This is necessary so that, when assembled, the fingers will not bind.

The balance of the work is very simple and it is only necessary to use ordinary care in the construction of the various parts.

In addition to those pieces shown in detail, there will be required five pieces 1½ by 34 by ⅜ in. These are to form the dividing bars between the fingers and must be bored with holes of the same size and directly in line with those in the top and bottom bars. Also, there will be required two pieces of No. 9 wire, 8½ in. long, with one end of each piece bent at right angles, ½ in. from the end.

In assembling, the corners of the top and bottom bars must be screwed to the uprights. The dividing bars can be securely held in place by 4d finishing nails driven through the uprights and into the ends of these bars. The fingers are then inserted between the dividing bars — six pointing to the right and six pointing to the left — and the two pieces of wire pushed down through the holes in the bars and fingers.

Of course, maple is the ideal wood to use. However, hard pine, cypress or, in fact, almost any straight-grained wood will answer.

No stain, varnish, or paint should be applied, as it is too likely to come off on damp clothes which may be hung on the rack.

After completing the assembly, two screw eyes are to be put in the top bar and the rack is then ready to be hung on the wall of the kitchen or laundry room.

PREVENTING TOOLS FROM RUSTING

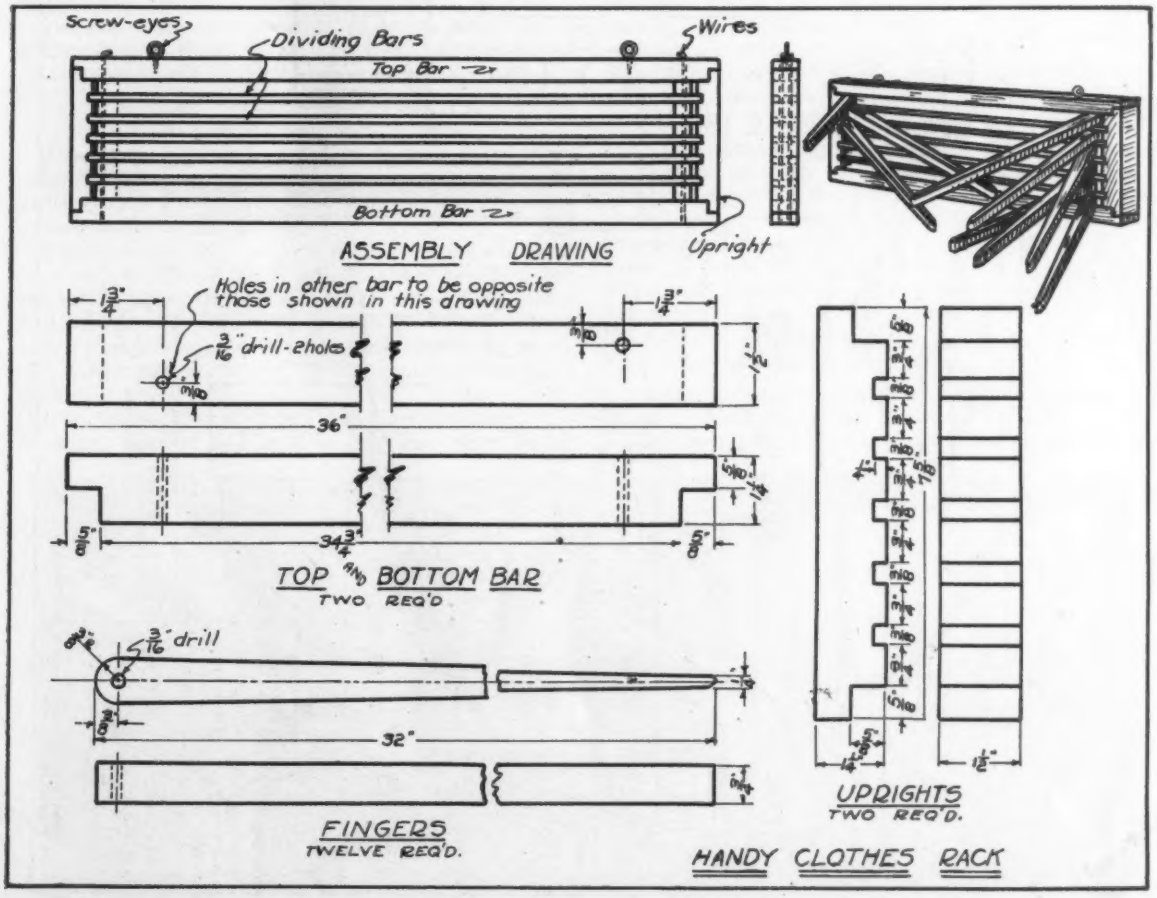
V. C. Darby, Cedar Rapids, Iowa

When steel tools are left for any length of time without attention, they invariably rust. This is particularly true of polished steel, and unless the surface is well protected, contact with moisture will result in almost immediate rust.

When tools are to be left for a short time only, rubbing them with an oiled rag will afford the needed protection against rust. But when left without attention for more than several months at a time, some other means must be employed. It is not always understood just what method should be followed. I have found the following procedure satisfactory:

First, wipe the tool clean and dry with an absorbent rag, and with steel wool or extra-fine emery cloth, remove any accumulated rust or scale. Then apply a generous coat of light oil. The oil must be of good quality, and of a nonacid nature. A gun oil is to be recommended. It is desirable that the oil should reach every part of the tool. Better results may be obtained if the oil is slightly warmed. Setting the can of oil in a larger can of hot water will warm it sufficiently.

Second, wrap the tool in clean wax paper, using a sheet large enough to adequately cover the tool. Then place the wrapped tool on a hot surface, such as a steam radiator or electric hot plate, leaving it there just long enough to soften the wax on the paper. This will seal the wrapper, making an air-tight and moistureproof container for the tool.



Tools treated by this method may be left for years without fearing that rust or corrosion will harm them.

BENCH VISE

K. W. Little, High School, Rockville, Connecticut

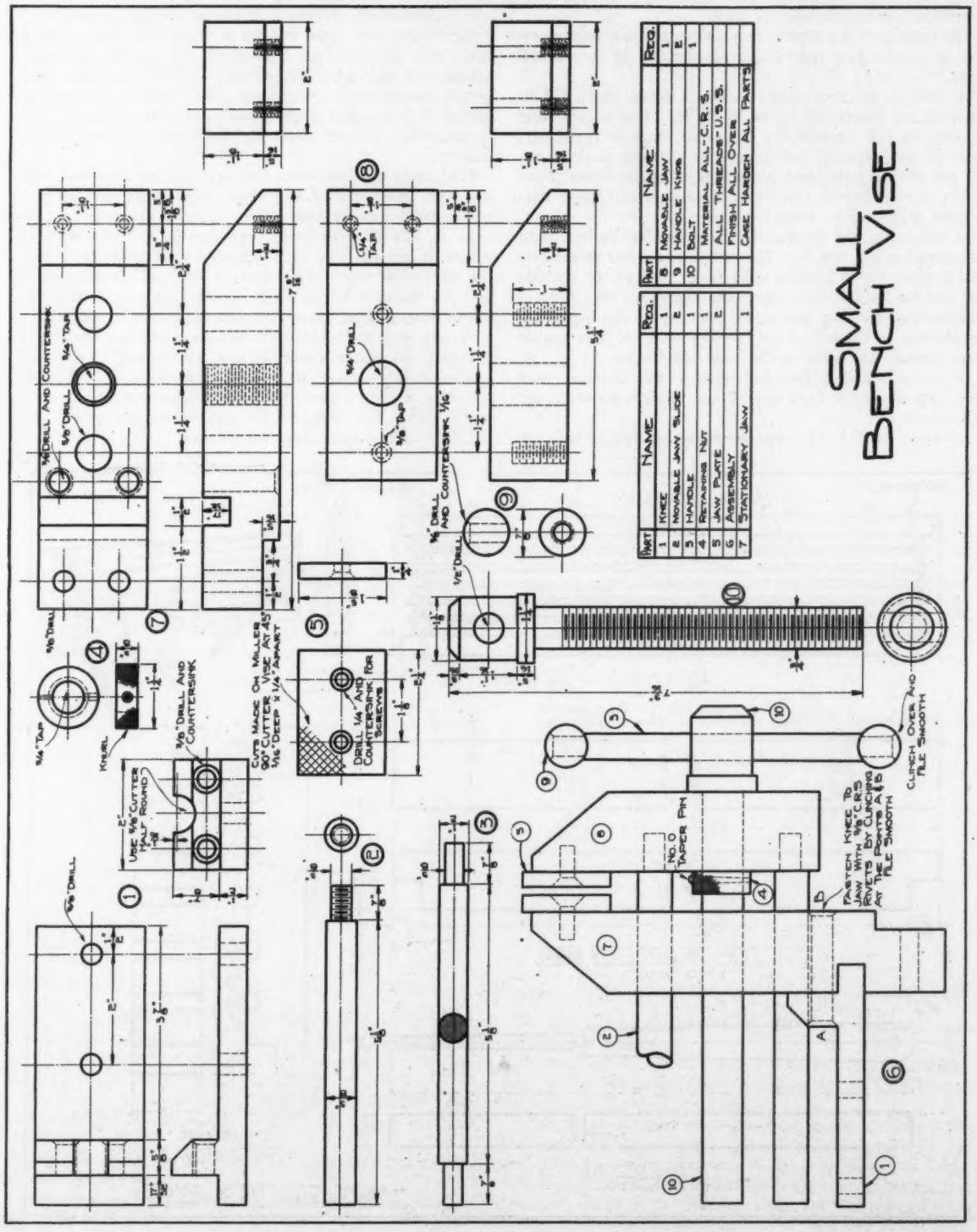
Some of the most desirable projects for machine-shop practice require castings. Because of this fact such projects are barred from those schools that can neither make castings nor have them made.

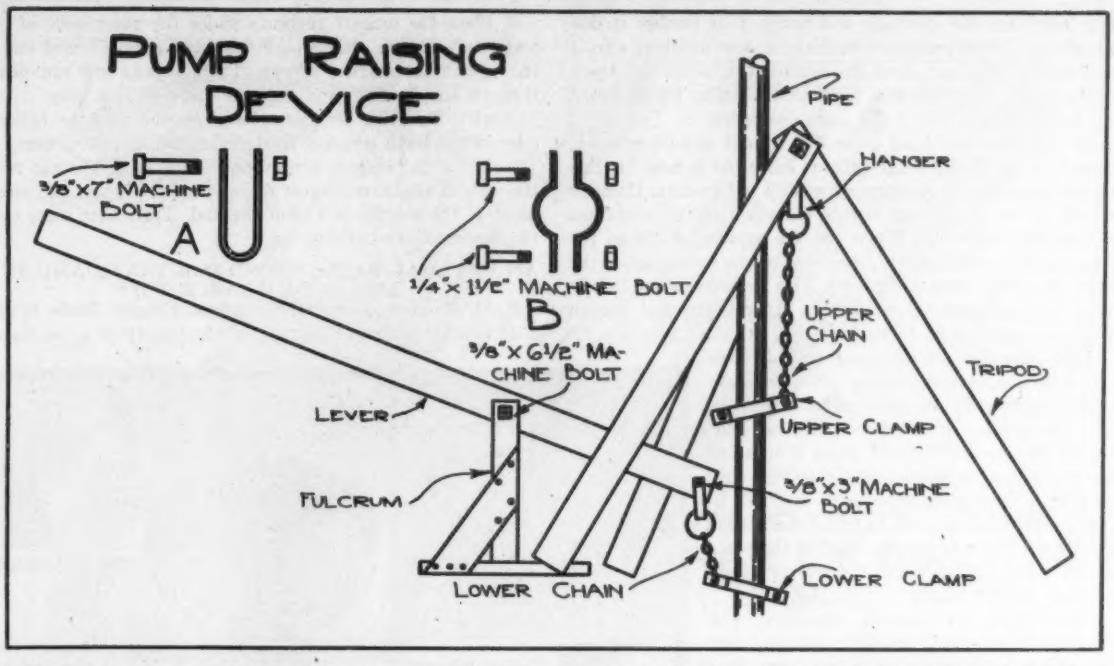
The common bench vise usually offers this difficuty. However, we have tried to overcome the handicap that lack of facilities for making castings places on us by using a different mode of construction in building the vise.

This particular form of the vise is not new to machine-shop teachers, but we have embodied several improvements which make the projects more practical, both, as a useful tool and for instructional material.

Just a few hints concerning the construction of the vise:

1. Drill and countersink the jaw plates before making diagonal cuts on miller.


SMALL BENCH VISE
PART NAME REQ.
1 KNEE 1
2 MOVABLE JAW SLIDE 2
3 HANDLE 1
4 RETAINING NUT 1
5 JAW PLATE 2
6 ASSEMBLY
7 STATIONARY JAW 1
8 MOVABLE JAW 1
9 HANDLE KNOB 1
10 BOLT 1
MATERIAL ALL-C.R.S.
ALL THREADS-U.S.S.
FINISH ALL OVER
CASE HARDEN ALL PARTS
DRILL AND COUNTERSINK
TAP
DRILL
CUT MADE ON MILLER 90° CUTTER VISE AT 45° 1/16" DEEP X 1/4" APART
DRILL 1/4" AND COUNTERSINK FOR SCREWS
USE 3/8" CUTTER HALF ROUND
KNURL
NO. 0 TAPER PIN
FASTEN KNEE TO JAW WITH NO. 8 RIVETS BY CLINCHING AT THE POINTS A & B FILE SMOOTH
CLINCH OVER AND FILE SMOOTH



2. Drill the stationary and movable jaws together, thus giving perfect alignment.

3. Tap the ¾-in. hole in the stationary jaw before cutting threads on the bolt. Use this as a gauge for cutting the threads.

4. Cut a dado in the stationary jaw that received the tenon of the knee. Then fit the tenon to the dado.

The knee may also be fastened to the stationary jaw by welding or by a shrink fit, should the method given in the drawing prove unsatisfactory to the builder.

A HANDY PUMP-RAISING DEVICE

L. M. Jordan, Donalsonville, Georgia

Occasionally it becomes necessary to remove the pump piping from the well for repairing the valves, replacing worn parts, etc. The accompanying illustrations show how to make a handy device for this purpose.

A tripod is made of 3 pieces of 2 by 4, 5 ft. long by passing a bolt through one end of each after they have been laid side to side. Before assembling these, a U-shaped chain hanger made of a piece of 3/16 by ¾ by 20-in. band iron, as shown at A in Figure 3, is put astride the central leg of the tripod. This hanger supports a short piece of ordinary farm trace chain.

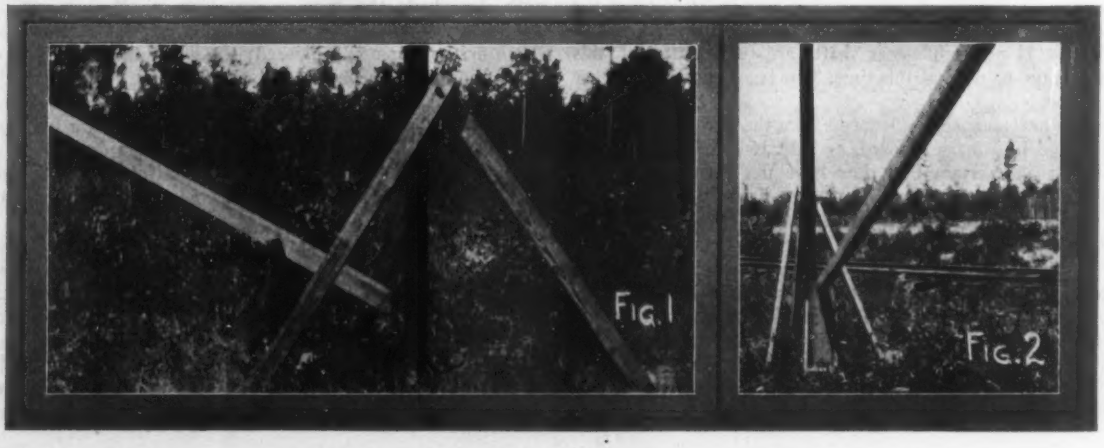
Two clamps, shown at B in Figure 3 are next made, each requiring a piece ¼ by 1 by 12-in. band iron. Make another hanger similar to the one attached to the tripod and place it at one end of the piece of 2 by 4, 8 ft. long which forms the lever. A shorter piece of trace chain is suspended from this hanger. Provide a fulcrum for the lever by slotting the end of a piece of 3 by 6 by 20-in. lumber and fasten it to the center of a piece of 3 by 6 by 18-in. lumber. It must be braced as shown in Figure 3. A ⅜ by 6½-in. machine bolt passes through the fulcrum and the lever.

Attach one of the pipe clamps to the upper chain, and the other to the chain on the lever. Set the tripod up as shown, with the two outside legs astride the piping and the top end of the center leg against it. Place the two clamps loosely around the piping so that they will slip freely on it. By raising and lowering the lever, one man can lift any ordinary column alone. In depressing the lever, the lower clamp locks the piping, raising it a few inches, and when the lever is reversed the upper clamp grips the piping, holding it for another stroke of the lever. The pipe may be held at any desired height to be worked upon. It may also be lowered into the well with the same device, but an assistant is required to slip the clamps up around the piping as the lever is operated. Figures 1 and 2 show the device in use.

DEMONSTRATING THE WARPING OF WOOD

Frank W. Dejmek, Marinette, Wisconsin

When boys ask why a board checks and warps, they are



often told that the checking and warping of lumber is due to moisture. Often nothing is said about how moisture effects wood in this way, and about the conditions under which these results occur. Checking and warping can easily be explained and demonstrated during the class discussion.

Cut off three pieces, of 3- or 4-in. round or square stock, about 3/16 in. thick. White pine or basswood is best for this purpose because it responds very readily to moisture. Dampen one side of one piece, and explain the effect the moisture has on that piece of wood. While you are explaining this to the class, the piece will begin to curl, due to the expansion of the fibers that have been dampened. This demonstration clearly shows that moisture causes wood to expand, and that uneven expansion causes wood to warp.

Then take the second piece and dampen both sides, so that the entire piece becomes moist. Immediately the piece will begin to expand throughout. After allowing several minutes for the wood to expand, place it on a hot pipe or some other heating device, so that only one side of the piece is exposed to the heat. In a very short time the side to which the heat is applied will begin to shrink, causing the piece to curl. This clearly shows the effect uneven shrinkage has on wood.

Quite often the uneven expansion and shrinkage is so rapid, that it causes the thin pieces of wood to crack. When this takes place the boys can readily understand why logs and lumber often have large cracks at the ends.

Next, take the third piece and dampen it throughout. Then place this piece in such a position, and place, so that it may dry evenly. When it has dried it will be as straight as it was before the water was applied. This proves that warping is due to the uneven expansion and shrinkage, rather than to the moisture alone. It also illustrates the principle of kiln-drying.

I have found this to be one of the simplest and quickest methods of demonstrating the effect of moisture on wood.

TYPICAL JOB SHEET FOR THE AUTO SHOP

Ray F. Kuns, Cincinnati, Ohio

Removing Ford Model T Magnets and Installing New Ones

1. Use a cold chisel to cut off the burred ends of the magnet-clamp screws, as indicated in Figure 1. Remove the screws at A, Figure 3.

2. Lift off the flywheel ring gear, Figure 2.

3. Remove the 16 cap screws holding the inner ends of the magnets, (B, Fig. 3) after which they may be lifted off of the flywheel.

NOTE: If new triple-gear shafts are to be installed, this work should be done at this time. This is explained in another operation.

When new magnets are shipped from the Ford factory, they are placed in a magnet board, as indicated in Figure 4. It is well to make certain that they have not been disturbed in their position before removing them from the board and placing them on the flywheel. The easiest way to check this is to notice whether the magnet ends, adjacent to each other, will *stick* together or whether they attract each other. In no case should they do this. If they do attract each other, they must be turned over until no two are found to stick together.

4. Position the magnets on the flywheel and run in the magnet bolts and washers, drawing them down loosely.

5. Test them to see if in any case the adjacent ends attract each other. A compass may be used for this.

6. Place the magnet supports under the outer ends of the magnets with the clamp over the ends (Fig. 5) and install the new brass magnet screws. These screws are run down through the flywheel and through the new ring gear.

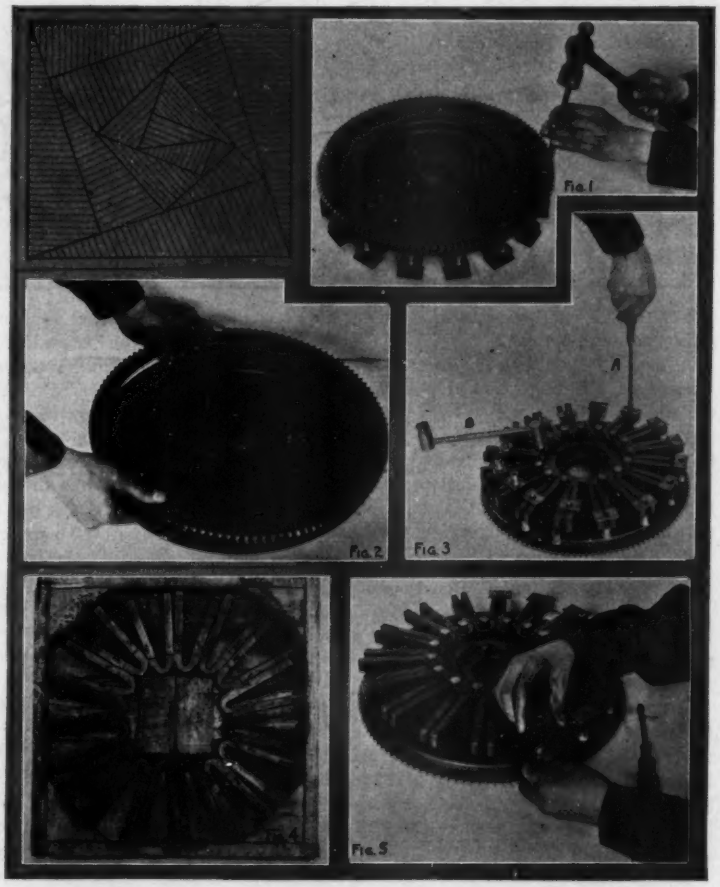
NOTE: This ring gear must be assembled with the beveled edge of the teeth pointing toward the transmission drums.

7. Draw the magnet screws and bolts snug. Do not rivet the ends of the brass magnet screws until the height and alignment of the magnet has been checked. Then burr them over to prevent them backing out.

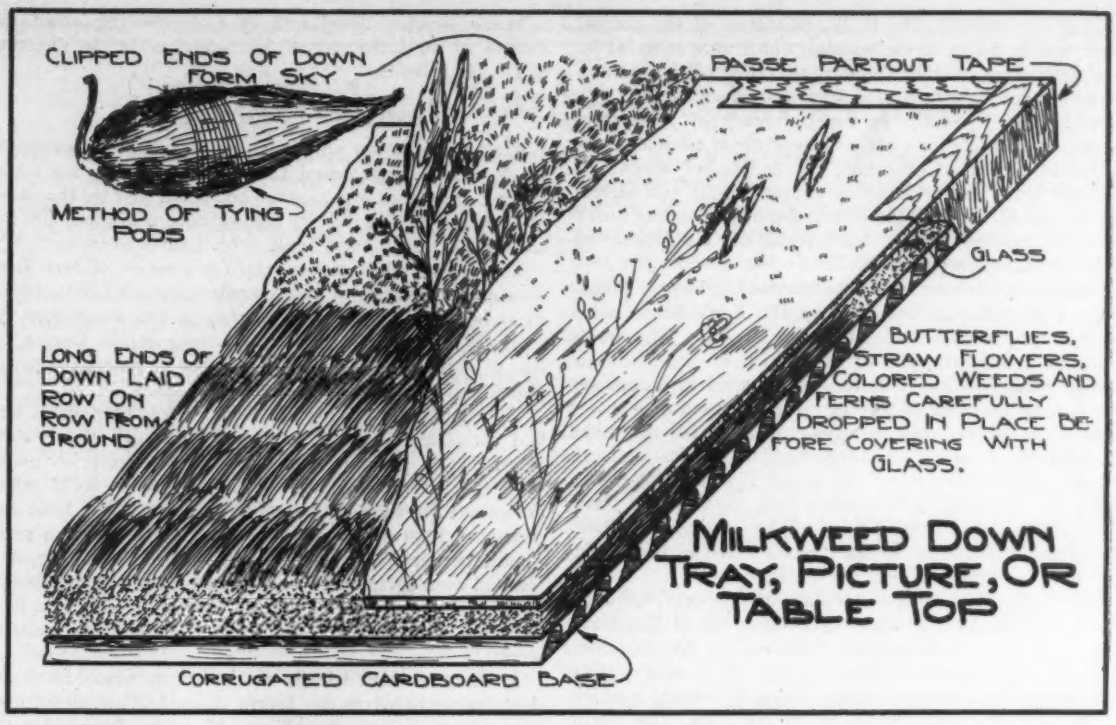
AN UNUSUAL BACKGROUND FOR TRAYS, AND TEA- AND COFFEE-TABLE TOPS

R. M. Hammes, Lincoln High School, Council Bluffs, Iowa

It is impossible to show any of the beauty of a tea-wagon tray or coffee-table top made in the manner which is herewith described; the bare construction is all that can be shown in a sketch. The background is formed of the silky down of the common milkweed; the long silky threads form the ground and the ends clipped from the down form the sky. Colored weeds, ferns, grasses, and straw flowers are carefully dropped in place to form the foreground and a few butterflies placed as though resting on the flowers or at flight in the air, complete this unusual and beautiful setting. A tray of this sort also may be used as a picture or a mantel decoration.



The first thing to do is to collect a number of milkweed pods before they have begun to open. Tie each pod as shown and store away until ready to be used. A few prettily colored butterfiies are necessary. They may be captured during the summer and fall months or may be purchased from dealers selling this kind of material. If captured, they should be chloroformed, and the wings adjusted to simulate rest or flight, and stored away between layers of tissue or cotton.


CLIPPED ENDS OF DOWN FORM SKY
PASSE PARTOUT TAPE
METHOD OF TYING PODS
GLASS
LONG ENDS OF DOWN LAID ROW ON ROW FROM GROUND
BUTTERFLIES, STRAW FLOWERS, COLORED WEEDS AND FERNS CAREFULLY DROPPED IN PLACE BEFORE COVERING WITH GLASS.
MILKWEED DOWN TRAY, PICTURE, OR TABLE TOP
CORRUGATED CARDBOARD BASE

Next, secure some small ferns, colored grasses and weeds, and straw flowers from your florist, a roll of passe partout tape from the stationers, a piece of glass the size you desire and a piece of heavy cardboard, or corrugated board to serve as the base. A few pasteboard boxes are needed, one to catch the seeds and a few to catch the clipped ends of down. A few spring-clip clothespins also are necessary for clamping the parts together while fastening the passe partout tape.

When all is in readiness take one of the pods, cut the string and break open, carefully grasp a quantity of the down between the first three fingers and thumb, pull off straggly down and strip off seeds, then clip ends where seeds were fastened. These ends should be clipped about ⅜ in. in length. Lay the long silky tufts in rows across the lower half of the cardboard, beginning with the top row first, each lower row overlaps the upper one. Arrange these tufts so as to prevent the cardboard showing through anywhere. When the rows are laid, carefully distribute the clipped ends over the upper half or remaining half of the board. It may be necessary to clip some extra ends for this, but if the bottom half is well done there will be ample clippings to form the sky. Next carefully drop the weeds, ferns and flowers in the desired places and then arrange the butterflies. After this is done, place the glass carefully over the whole and press down, clamping it in place with the clothespins. Wet the mucilage side of the tape. This tape should be about 1 in. wide so as to fit over the edge of the glass, down over the side, and then over the edge of the pasteboard back. It must be fastened carefully. After the passe partout has been put on, it is wise to place the whole between two flat surfaces and weight them down so as to insure a well-fastened job.

The picture thus formed may be framed in to form a tray or a tea-wagon top, or it may serve as a coffee-table top or picture. Some may prefer to leave it unframed except for the passe partout and use it in this way as a mantel decoration. The completion of one such article will prompt the making of several as the results far surpass the effort.

MORE ELASTIC COURSES IN HIGH SCOOLS

Whether high schools should give vocational training to their pupils is a question on which teachers and school administrators of New York state differ sharply. Dr. W. W. Coxe, chief of the state bureau of educational research, in a report on the findings of a recent state-wide survey, shows that teachers generally favor courses of wider scope than those at present offered.

Mr. Coxe, in his report, brings out the fact that the teachers express a wide range of opinion, running from not at all, to definite vocational training, with all sorts of intermediate statements. Those who are opposed to vocational training are the same teachers who think of the high school as college preparatory. Those who are in favor point out that the high school is the one place wherein the pupils can receive any vocational training.

Commenting on what is meant by preparing for specific vocations, Mr. Coxe pointed out that some teachers see vocational training in the traditional subjects, or realize that they may be easily modified to have vocational values; others believe that specific vocational training must involve the introduction of highly specialized courses. Some point out that a cultural background has value in any vocation.

In general, it is found that teachers favor uniform high-school courses, although teachers in New York City tend slightly to oppose uniform courses and teachers in the smaller schools tend overwhelmingly to favor uniform courses. Uniformity is favored because higher standards are possible, transfers are easier, diplomas mean the same thing, and pupils in small schools will not be penalized.

Suggested additions to the course, in the order of frequency, are: domestic science, vocational subjects, manual training, social science, public speaking, hygiene, character training, art and music, business training, civics, grammar, economics, etiquette, music, general history, spelling, and vocational guidance.

THIRTEENTH ANNUAL REGIONAL CONFERENCE OF THE FEDERAL BOARD FOR VOCATIONAL EDUCATION

The thirteenth annual regional conference in trade and industrial education for the central region of the United States, called by the Federal Board for Vocational Education, was held March 24–27, at Minneapolis, Minn. The sessions took place in the Dunwoody Industrial Institute, where facilities were afforded for the sessions and other activities in connec-

tion with the meeting. Mr. R. W. Billington, of the Federal Board, was in charge of the sessions, which were attended by state supervisors, teacher trainers, and local officials having charge of supervisory work in industrial education.

Dr. Homer J. Smith, of the University of Minnesota, presented an outline for a nation-wide study of advisory committees in vocational education, the findings of which will form the basis for a bulletin of encouragement and suggestion to committees. The conference asked the Federal Board to assume the responsibility for carrying out the suggestions made for organizing the study.

A report on Methods of Reimbursement Used by the States of the Central Region was made by Mr. K. G. Smith, state supervisor of industrial education for Michigan. Mr. Smith presented a summary and an explanation of the Michigan system, which provides reimbursement varied in percentage according to the rating of teachers in qualifications.

Mr. C. L. Wetzel, state supervisor of industrial education for Missouri, reporting for the committee on instructional material exhibits, explained in detail how building-trades classes are organized in Missouri to meet the needs of small towns of the state in training for employment opportunities. The proper selection of students was stressed in order that boys may be trained as building tradesmen.

Prof. A. W. May, of the University of Kentucky, prepared a talk on "Methods of Training Evening-School Teachers" which was read at the meeting. "Training of Aviation Mechanics" was the subject given by Mr. E. F. Riley, state supervisor of industrial education for North Dakota, in which he explained the plan carried on in his state. The North Dakota School of Science is the ground school where repair work is carried on for a large area in the northwest.

Mr. Perry W. Reeves, of the Federal Board, gave an analysis of "The Trinity of Vocational Education," in which the fundamentals of education and training for work were divided into the elements of (1) need for training, (2) selected groups, (3) professionally qualified instructors, (4) functioning subject matter of content, (5) attainment of occupational standards, (6) jobs for practice training, (7) repetitive training for job getting, and (8) placement and follow-up for trained persons. It was indicated that in each element, the particular service may best be rendered by the school, the employer, or the worker toward the successful initiation and promotion of a vocational program.

"The Development and Use of Individual Instruction Sheets" was presented by Mr. F. S. Barrows, director of vocational education, Hammond, Ind.

Mrs. Cora C. Alderton gave an instructive report on a five-year study of the work in the retail training department of the girl's vocational school of Minneapolis.

Mr. E. E. Gunn, Jr., assistant director of vocational education for Wisconsin, explained the developments in adult-extension training in the state, pointing out that the trade and industrial service of the Wisconsin state board has been developed on the principle that the trade and industrial departments of the vocational schools are the service stations of the communities in relation to the needs of the trades and industries of the state.

Mr. I. R. Anderson, principal of the Lathrop Trade School, Kansas City, Mo., directed a conference discussion on the "Teaching of Related Subjects."

Mr. Sidney Owen, of Nebraska, reported on the results of a state-wide trade-extension course for bakers, sponsored through the master bakers' association.

Mr. Frank Cushman, chief of the industrial-education service of the Federal Board, discussed plans for future conferences for state supervisors and teacher trainers.

The conference appointed a committee of four, comprising Mr. H. J. Smith, Mr. E. E. Gunn, Mr. R. W. Selvidge, and Mr. Sidney Owen, to work out plans for the next annual conference.

The conference closed with an inspection trip about the campus of the University of Minnesota, under the direction of Dr. H. J. Smith.

FAILURES IN HIGH SCHOOL

The committee on vocational and industrial education of the New York High School Teachers' Association, in a recent report to the board of education, points out that for thousands of boys and girls in the city high schools, education does not mean opportunity, but a futile effort leading to failure.

The findings which are contained in a report of Mrs. Dora Thompson, chairman of the committee, presents the achievement records of pupils who are failing, and emphasizes the need for a different treatment for these pupils. During the course of the year the committee hopes to offer constructive suggestions for solving the problem.

The committee, which studied the records of students who had completed three or more terms in high-school work, found that 37 per cent of all the students were below grade.

In the twelve Brooklyn high schools where 6,278 pupils are enrolled in the fourth term, it was found that 3,905 students had been promoted to the fourth-term progress grade after three terms of work, while 2,273 had taken four, five, six, and even seven terms to reach the fourth term. That is, 36 per cent of all the high-school students in Brooklyn have not been able to reach the fourth term after three terms of work.

In the seven high schools of Manhattan, where 3,616 students are enrolled in the fourth term, 2,443 students have been promoted to the fourth term after three terms of work; while 1,173 have taken four, five, six, and seven terms to reach the fourth term. That is, 32 per cent of all the fourth-term students in Manhattan have not been able to reach the fourth term after three terms of work. Similar conditions exist in all the other boroughs, with 32 per cent failing in the Bronx, 40 per cent in Staten Island, and 46 per cent in Queens.

In contrast with these figures, the committee gave figures showing the progress of technical and industrial students in the Washington Irving High School, where courses in industrial art, domestic art, and domestic science are given, in addition to the academic and commercial courses. Of 132 students in the fourth term — domestic-art course, 131 were promoted after three terms of work. In the industrial-art course, 78 of the 79 students reached the fourth term after three terms of work.

The committee came to the conclusion that the 37 per cent of students failing of promotion might win success, and even distinction, if they were given courses which would enable them to meet the needs of a fast-changing civilization. The high school has been plunged into a most difficult situation and the school officials must meet the problem and find a solution.

URGES VOCATIONAL COURSES

Dr. William J. Cooper, Commissioner of Education, in a talk before the Academic Principals of New York state, declared that secondary schools must formulate a suitable plan of education for 100 per cent of the boys and girls of high-school age, between 14 and 18. Dr. Cooper pointed out that about 53 per cent of the students between the ages of 14 and 18 years are attending high school, and that the percentage is constantly increasing. There should be changes in the courses of study and aims of education to provide boys and girls of high-school age with the education they find most useful.

Dr. Cooper pointed out that, although there has been a tendency to push the educational age upward in industry, still it should be remembered that someone must be taught to work a nine-hour day. High schools must arrange their curriculums so that students who will have to labor to earn their living will be given an opportunity to learn a useful occupation.

Anent the Change of Our Name

The following exerpts were taken from a few of the many letters which we received commenting on the changing of our name from INDUSTRIAL-ARTS MAGAZINE to INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

• • • •

"I believe your move is a good one. The new name, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION indicates what, I believe, really to be the scope of your magazine. . . . As I understand it, your magazine is planned to serve the teachers who work with students throughout the whole avenue of education, extending from the beginning exploratory courses on to the final steps in vocational adjustment. I think it fortunate that your magazine title is being expanded to indicate the range of content."—*Clyde A. Bowman, dean, school of industrial education, The Stout Institute, Menomonie, Wisconsin.*

• • • •

"In any event, I am glad to notice that the general policy of the magazine will remain unchanged and that the splendid contributions you are making month by month will continue as in the past."—*Arthur B. Mays, professor industrial education, University of Illinois, Urbana, Illinois.*

• • • •

"I have a feeling that INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will more truly represent the scope of your magazine than the name under which it has been successfully carried on for sixteen years. But no matter what you call your magazine, I hope it will continue for at least another quarter of a century, as I cannot see very well how we could get along without it."—*S. T. Newton, director of technical education, Winnipeg, Manitoba, Canada.*

• • • •

"INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is a fitting name for a magazine which will serve these two phases of industrial education — industrial arts and vocational education. Your change in name is simply giving expression, or we might say, stating clearly to newcomers, exactly for whom your magazine is intended. We who have been your readers for several years, have not felt the need of any change, but now that you have made the change we are glad to recognize the appropriateness of the new name."—*Earl L. Bedell, assistant director vocational education, Detroit, Michigan.*

• • • •

"Industrial arts, I do not feel fully expresses the constantly growing vocational-education movement with which your organization has constantly kept pace. Although a name may not be so important, there is no reason why it should not express the character of its content."—*Harold J. Van Westrienen, director vocational education, Hamtramck, Michigan.*

• • • •

"I believe the selection of the name you have made is appropriate to the service that your magazine is rendering. . . . The name 'industrial arts' will appeal to the schools calling their work, manual training, manual arts, prevocational education, practical arts, and shopwork, while the name 'vocational education' will appeal to those who work in the fields of vocational education, industrial education, technical education, trade training, and the like.

"I realize that what you do is what counts and not what you call your work but, I too, have felt that the name 'industrial arts' has been too limited to cover the scope of your publication. I hope that the change in name will be a happy one and I wish you greater success under the new appellation."—*Roy R. Van Duzee, supervisor industrial arts, West Allis, Wis.*

• • • •

"It is very refreshing to learn that you are contemplating changing the name of the INDUSTRIAL-ARTS MAGAZINE to one which is more accurate. I like the proposed name very much and think that it represents a very desirable improvement."—*Wm. F. Rasche, principal, Milwaukee Vocational School, Milwaukee, Wisconsin.*

NOW, ARE THERE ANY QUESTIONS?

REFINISHING OLD AND NEW CHERRY WOOD

917. Q.: Recently we came into possession of an old cherry four-poster bed. As these old beds are both short and narrow we made it standard size with the aid of some new cherry. Now we are having difficulty in staining the two so they will look alike. The old cherry was turned in the lathe beneath the old finish and then all was stained with an oil stain. We used more burnt sienna in the stain for the new than for the old cherry and even tried heating it to the boiling point before applying it to the new cherry, but still the new cherry is far too light and does not have the deep rich coloring that the old has. Will you please suggest how the shades may be matched? — *J. S. D.*

A.: Your initial mistake in trying to match the color of the old and new cherry, was in the use of a point which you termed "an oil stain." This is not, and cannot be considered as a stain; it is a paint and nothing else, since it was made on an oil and burnt-sienna base. Heating such a mixture would have no effect whatever, as you found out.

The only recourse left, is to make up a hot solution of Gold Dust Twins soap powder, using a cup of powder per 10-quart pail of hot water and scrub off all the oil with a fiber brush. Let dry and sand to bright clean wood as though this were an old bed being refinished. Make up a weak stain of mahogany water-stain powder, using ½ oz. of mahogany red and 1½ oz. of mahogany brown in 1 gallon of hot water. Apply while hot, let dry and sand clean and smooth with a split 6/0 garnet paper. Restain with the same stain diluted one half, being careful to avoid sags or drips and using a

well-loaded brush to carry a very wet edge at all times. Turned work should be roughly coated in and then immediately gone over with an almost dry brush to even up the coating.

Let dry, apply a sizing coat of orange shellac reduced with three parts of denatured alcohol and stirred slowly into an equal volume of shellac-mixing lacquer. This will give a fine foundation to which subsequent finishing coats will adhere without trouble. Let the coating dry, sand smooth with split 6/0 finishing paper. Apply a well-brushed-out coat of 4-hour varnish to the carefully dusted work. Let dry overnight, sand with a split paper and recoat. Recoat to the desired amount, and rub the last coat with crude oil, FFF pumice stone, and rubbing felt. Clean up with a good polish. A job put through our paint shop in this way, gave perfect matchings on a cherry table top with new wood inserts. — *Ralph G. Waring.*

TOXICITY OF LUMBER

919. Q.: About four weeks ago I bought kiln-dried oak which I then surfaced to the required thickness, working with it for about an hour. After a little while I felt a smarting of the eyes and later that evening my face had swollen to such an extent that my eyes were closed, and a rash commenced to appear on my face, neck, and arms. The skin specialist who treated me is not willing to say that I was poisoned by the oak, but he says it looks very much like it.

Are there other cases on record where persons were poisoned by handling kiln-dryed lumber? Have you any remedy that can be used after a person has become poisoned in this way? — *J. A. W.*

A.: It has been my experience that various operators react differently to the dusts of the various woods which they have occasion to machine. When I worked in the case room of a piano manufacturer, the sand dust from black walnut affected me in the same manner that a similar amount of black pepper might be expected to produce. If this irritation was allowed to continue, rupture of the mucous tissue usually followed. Chestnut and black-walnut dust both irritate my skin if I work in them for any length of time. I find that other woods affect other men in a similar manner. There is apparently no qualitative method of determining the toxicity of various woods, since it seldom happens that an individual is affected in a manner similar to that of another operator working on the same material; as a matter of fact, the second man may not be bothered at all.

I have found that where the toxicity of any wood is sufficient to cause skin eruptions, or rash, as it is termed, that a 5-per-cent solution of tincture of iron in pure ethyl (grain) alcohol as in poison ivy control, is generally very effective. The fact that the wood is, or is not kiln-dried has little or nothing to do with the problem, as I have found men working with walnut saw logs wet from the mill pond to be affected just as badly as another operator on furniture stock dried to 7 per cent.

In case compensation is sought in this case, your subscriber can only show incapacity due to possible infection. It is entirely possible that the irritation was produced by some other dust than that occasioned by machining the oak. It would be practically an impossibility for one to testify under oath that the infection was caused by machining this particular shipment of oak. As a matter of fact, I admire the reticence of the skin specialist retained in this case, to state definitely that the infection was caused by this oak. — *Ralph G. Waring.*

PLASTIC CLAY

920. Q.: Will you please give me a formula for treating common clay so as to render it permanently plastic for modeling purposes? — *C. E. T.*

A.: Clay may be made permanently plastic by mixing it with glycerin and vaseline. It is probably best to first mix the clay with the glycerin and then add enough vaseline to get the clay of the right consistency. By mixing up a small batch of the clay, the right proportions of vaseline to glycerin may be obtained.

RUST PREVENTION

922. Q.: Are there any moisture-repellant coatings for tools on the market? Can anyone make a satisfactory solution. I have noticed a coating on crosscut saws (log) in hardware stores, but have been unable to find out the composition of it. — *G. W.*

A.: A moisture-repellant coating may be made by taking ½ oz. of powdered rosin, ¼ pt. of linseed oil, either boiled or raw, and 2 pts. of kerosene oil. Mix these thoroughly and apply with a brush. The mixture can be readily removed when the tool is to be returned to service.

FRANK ELLIOT MATHEWSON PASSES

Mr. Frank Elliot Mathewson, educator and author, who died recently at Jersey City, N. J., was born in Chicopee Falls, Mass., October 28, 1869.

FRANK ELLIOT MATHEWSON

After leaving the public schools of Chicopee Falls, Mr. Mathewson entered the employ of the Chicopee Mfg. Company as machinist and draftsman from 1884 to 1889. This was followed by ten years with the Lamb Manufacturing Company and the A. G. Spalding Company, as designer and chief draftsman from 1889 to 1899, during which time Mr. Mathewson originated many important inventions related to the chainless bicycle and gymnasium apparatus.

From 1892 to 1896, Mr. Mathewson was instructor in evening drawing classes of Chicopee Falls, and from 1896 to 1899 was employed as principal of the evening drafting school at Springfield. In December, 1899, he was made an instructor in the Technical High School and Evening School of Trades, at Springfield, where he remained until June, 1908, when he was made head of the drawing department.

In May, 1908, Mr. Mathewson became assistant principal in charge of shopwork and drawing in the Cleveland High School, where he was responsible for the department of technical work and its relation to the academic work of the school. He resigned this position to go to Wentworth Institute, Boston, to assist in the development of courses in that institution.

In January, 1912, he was appointed to organize and equip the industrial department in the Dickinson High School, Jersey City, N. J. In addition, he was director of special trade education for the Jersey City schools, which position he held up to the time of his death.

An important part of his service to education was his work as executive secretary of the Eastern Arts Association, which he built up into a strong and vigorous organization. Through his strong personality, supplemented by wide experience, expert ability, and strong human interest, he was successful in placing the association in the forefront of educational influence in the United States. He was the first president of the New Jersey Vocational Association.

Mr. Mathewson was the author of a number of textbooks, among them, *Notes for Mechanical Drawing, Applied Mechanical Drawing, and Perspective Sketching for Woodworking Drawing.*

He is survived by his widow, Mrs. Emily Forbes Mathewson.

MR. HOWARD TO TEACH AT STATE TEACHERS COLLEGE

Mr. E. E. Howard, formerly director of industrial arts in the schools of Bloomsburg, Pennsylvania, was recently appointed as director of a similar department in the State Teachers College, Millersville, Pa.

MR. E. E. HOWARD
Director of Industrial Arts,
State Teachers College,
Millersville, Pa.

Mr. Howard was educated in the schools of Clearfield, Pennsylvania, and is a graduate of the Pennsylvania State College. He holds a B.S. degree in industrial education and is completing his graduate work in industrial education at the State College summer session. He organized and equipped the first general shop in Bloomsburg and has been director of shopwork in the junior and senior high schools for the past three years. He also has been active in school athletics and music.

Mr. Howard will have charge of the industrial-arts teacher-training work at the State Teachers College at Millersville, while Mr. S. L. Coover will hold a similar position at the State Teachers College at California, Pennsylvania.

Foundry Work

By William C. Stimpson, Burton L. Gray, and John Grennan. Cloth, 201 pages, illustrated. Price, $2. Published by The American Technical Society, Chicago, Ill.

A very comprehensive and thorough book on the fundamentals and current practices of foundry work.

Perspective Drawing

By Joseph Brahdy. Cloth, 104 pages, illustrated, Price, $2. Published by D. Van Nostrand Company, Inc., New York, N. Y.

This book on perspective drawing is especially intended for the architectural draftsman. The projection of the shadow is also included. A special chapter is devoted to perspective construction with measuring points, and tables to be used for constructing the scales are appended. A number of exercises which involve the text material contained in the book are added.

The Welding Encyclopedia

Compiled and edited by L. B. Mackenzie and H. S. Card. Flexible cloth, 496 pages, illustrated. Published by The Welding Engineer Publishing Co., Chicago, Ill.

This is the sixth edition of this handy reference book. Additional material to bring it up to date has been added to this new edition. This book will be found of great value to men who are studying welding in our evening vocational classes.

Oxyacetylene Welding and Cutting

By Stuart Plumley. Cloth, 302 pages, illustrated. Published by University Printing Company, Minneapolis, Minn.

This well-illustrated textbook on welding will be found very helpful to the teacher and student in the welding classes of our technical high schools and part-time and full-time vocational schools. The material is divided into 20 lessons, each lesson taking up a particular type of work, the whole making quite a comprehensive book on the subject of welding.

Bows and Arrows for Boys

By George C. Decker. Paper, 48 pages, illustrated. Price, 75 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

This interesting little booklet will be much appreciated by the teacher as well as the student who is interested in making the paraphernalia required for the ancient and fascinating sport of archery. The making of the bow, bowstring, arrow, accessories, instructions for shooting, and the rules of archery and archery games are thoroughly, though briefly covered.

Simple Lessons in Pen-and-Ink Rendering

By George G. Greene. Set of 16 plates. Price, 75 cents. Published by The Bruce Publishing Company, Milwaukee, Wisconsin.

This material is arranged in 16 separate instruction sheets. The lessons, which are especially designed for technical and architectural students, emphasize the processes which must be mastered to develop good technique. The material is well arranged and is found to captivate the interest of the student.

The Art of Block Cutting

By O. A. Hankammer and F. C. Lampe. Cloth, 162 pages, illustrated. Price, $4.75. Published by F. C. Lampe, 4840–42 West Chicago Avenue, Chicago, Ill.

Art instructors and teachers of printing, as well as their students, will be very much interested in this book on the art of block cutting. The book is replete with examples of the art of block cutting and wood engraving. The authors also show the application of block printing to color work.

Airplane Mechanics Rigging Handbook

By R. S. Hartz and E. E. Hall. Cloth, 267 pages, illustrated. Price, $3.50. Published by The Ronald Press Company, New York, N. Y.

With the increase in interest in all things aeronautical, the school-shop instructor of this subject will find great help in the book offered by the authors. While the book is held on the airplane mechanic level, the subject material is quite comprehensive. It is not, however, so technical that it defeats its own purpose.

Organization and Financing of Vocational Education in Agriculture for Ohio

By Ray Fife. Bulletin No. 144, April, 1930. Issued by the Federal Board for Vocational Education, Washington, D. C. This pamphlet represents the trends in principles and policies for vocational education as developed in the state of Ohio. It includes a survey of prospective all-day, part-time, and eve-

ning-course students as a means of estimating the cost of providing agricultural instruction as a part of the minimum program of education in the state. Based upon a survey of present needs, the program for vocational agriculture is expected to offer instruction in 191 high schools with 25 or more farm boys, the employment of 147 instructors on a half-time basis for 293 high schools with 15 to 24 boys, and approximately 85 instructors on a day-unit basis to serve remaining schools. Based on present plans and costs, the maximum development of the subject in Ohio will require a total federal and state reimbursement of $750,000.

Wood Utilization and Playground Activities

The National Committee on Wood Utilization of the Department of Commerce has published a booklet entitled, *You Can Make It,* which describes in simple language more than 100 articles which can be made by boys and girls during their spare hours, and which offers an elementary knowledge of the essential points of wood construction in various applications. The booklet is especially suitable for playground departments and associations as a guide in undertaking playground activities.

Yearbook in Farm Science

The U. S. Department of Agriculture, in its latest *Yearbook of Agriculture* for 1930, reports recent developments in agricultural science and practice. It offers up-to-date information on the important phases of agriculture, including agricultural research, economic developments, and applied agricultural science. The report contains a comprehensive compilation of agricultural statistics.

EASTERN ARTS ASSOCIATION MEETS IN BOSTON

The meeting of the Eastern Arts Association this year was one of the best and most successful meetings of the association. This was attributed to the large number of members who coöperated with the officers of the association and to the type of programs arranged for the various sections.

The first meeting of the industrial-arts section, in charge of Mr. B. A. Adams, supervisor of manual arts, Springfield, Mass., was well attended and the meeting was eminently worth while. Prof. G. U. Cleeton, of the Carnegie Institute of Technology, presented a paper on "The Relations and Aims of General Education and the Functions of Industrial Arts in the Junior High School. Professor Cleeton outlined the trend of educational aims over a period of 64 years, and quoted from the statements of leading educators.

An interesting phase of industrial education was presented by Henry Burghardt, head of the machine shops in Jersey City, N. J., in which he explained the plan for teaching machine-shop practice with a group of thirty boys. The same plan is used for the woodworking division. Each boy does the same thing at the same time and over 75 operations are learned by the boys during the first term. After the first tryout, the boys are given work on various machine tools, such as the shaper, drill press, and planer. Under this plan 120 boys can be trained during the first part of the year.

Mr. H. W. Giffin, director of coöperative industrial work at Bristol, Conn., gave an interesting description of a plan for the training of boys in patternmaking, foundry work, woodworking, and machine-shop practice. The boys who take the work come from the grammar schools and must have reached the age of 14. While the boys have previously stated their preference for a certain type of work, some change to other work, at a later date, and others prove that they are not fitted for the type of work which they selected. While the group originally was composed of 48 boys, it dwindled to 24 at the middle of the first year of shopwork.

At the start of the school year, two groups are formed, one attending school, while the other group is at work. During the summer-vacation season, the boys enter the shops for a tryout period. When the training period is completed and good work has been done, a bonus of $100 is paid to the boys.

Joseph H. Constantine, director of industrial education at Passaic, N. J., presented a plan of education for industrial-art training which begins with the elementary graded. All phases of industrial arts are taken up by the classroom teachers, and class projects are taken up in an interesting manner. The informational side of industrial-arts education is given a foremost place in the plan of education. It was evident that more emphasis has been placed on related information and not as much stress on individual problems and projects.

Mr. David Spence, of Springfield, Mass., took the topic, "Individualized Instruction in Related Shopwork." He emphasized the need of academic instruction, and showed its relations to actual shopwork. The plan involves the use of individual lesson sheets.

At the printing teachers' round table, Miss Louise C. MacDonald, of Roxbury, Mass., spoke on "The Correlation of Academic Subjects with Printing." Wilbur A. Hart, of Medford, Mass., gave a talk on "Printing in the Junior and Senior High School;" Mr. J. E. Mansfield, of Boston, Mass., discussed "Handling the Display Job;" Mr. R. V. Barry, of Roxbury, Mass., took up the subject, "Production Methods in a School Shop"; and Mr. J. B. Curry, editor of *The Trade Compositor,* gave a talk on "Modernistic Typography."

The meeting closed with the election of officers for the next year. These are:

President, Mr. Forrest Grant, director of art in the New York City schools; vice-president, Mr. James F. Barker, assistant superintendent of schools, Rochester, N. Y.; secretary-treasurer, the late Frank E. Mathewson, director of industrial arts, Jersey City, N. J. — *E.W. Manzer.*

WESTERN ARTS ASSOCIATION MEET AT MINNEAPOLIS

Minneapolis, the city of lakes, was a capable and affable hostess to the teachers, supervisors, and directors of the arts and industrial arts, who gathered to the number of 500 or more at the convention of the Western Arts Association, May 6 to 9.

Of especial interest to the industrial-arts teachers was the manual-training-section meeting on Tuesday afternoon. Mr. S. L. Coover, California State Teachers College, California, Pa., handled the subject "The Significance of the General Shop in Adjusting the Arts to Modern Education" in a very able manner. He exhibited a number of interesting projects which were produced in his school shops. He emphasized that in order to fulfill the requirements required by the school shop, all projects should (1) hold the student's interest, (2) foster creative tendencies, (3) develop skill, (4) dispense knowledge of the nature of the materials used, (5) possess a universal appeal, (6) embody opportunities for self-directed activity, (7) possess utility, and (8) be inexpensive.

Walter W. Sturtevant, South High School, Minneapolis, spoke on the "Methods and Content in Teaching Drawing." He emphasized the necessity of making a careful choice of what to include in our drawing courses and the necessity of standardizing the work so that the work done by pupils in the same grade at different schools could be more nearly recognized as being of the same level.

Dean M. Schweickhard, state supervisor of trade and industrial education, Minnesota, spoke on "Industrial Arts as Part of General Education." He pointed out that at least one third of what is usually conceived as general education ought to embrace industrial arts as an essential. Industrial-arts teachers, he said, must believe in the absolute necessity of the part which industrial education takes in general edu-

(Continued on Page 16a)

HAVE THESE ON HAND WHEN ORDERING AUTOSHOP TOOLS

Catalog "G," in the center, is the auto mechanics hand-book for ordering tools for the autoshop. It illustrates in complete detail the famous guaranteed line of SNAP-ON and BLUE-POINT tools. The folders illustrated present many special uses to which these tools are put in the workings of industry. Use the coupon below to secure these valuable booklets for your files. No obligation.

Snap-on	Blue-Point
Socket Wrenches	Chisels
Handles	Punches
Sockets	Wrenches
Sets	Valve Reamers
Special Service Wrenches	Boxocket Wrenches

and the many other tools listed in our catalog

Branch offices in twenty-seven cities are at your service in supplying you with such Snap-On and Blue-Point tools as will fill your requirements. Don't hesitate to call on them. Our budgets in the 1930 Bruce's School Shop Annual are also designed to help you. Use them.

BRANCHES IN THE FOLLOWING CITIES:

Atlanta, Ga., 334 W. Peachtree St., N.W.
Boston, Mass., 510 Cambridge St., Allston Dist.
Brooklyn, N. Y., 420 Empire Blvd.
Buffalo, N. Y., 1443 Main St.
Chicago, Illinois, 2025 Michigan Blvd.
Cleveland, Ohio, 6525 Euclid Ave.
Dallas, Texas, 2809 Main St.
Denver, Colorado, 17 W. 13th Ave.
Detroit, Michigan, 4450 John "R" St.
Indianapolis, Ind., 933 N. Illinois St.
Kansas City, Missouri, 2526 Grand Ave.
Los Angeles, Calif., 460 Venice Blvd.
Milwaukee, Wis., 452 Jackson St.
Minneapolis, Minn., 1218 Harmon Pl.
Montreal, Quebec, Canada, 1008 La Gauchetierre St., W.
Newark, N. J., 429 Central Ave.
New York, N. Y., 2721 Webster Ave. and 155 Sixth Ave.
Omaha, Nebr., 2039 Harney St.
Philadelphia, Pa., 1610 Fairmount Ave.
Pittsburgh, Pa., 5620 Penn Ave.
Richmond, Va., 603 W. Broad St.
San Francisco, Calif., 280 Golden Gate Ave.
Seattle, Wash., 301 E. Pine St.
St. Louis, Mo., 2647 Washington Blvd.
Toledo, Ohio, 1439 Jackson St.
Toronto, Ont., Canada, 54 Dundas St., West.
Vancouver, B. C., Canada, 945 Davie St.

Motor Tool Specialty Co.

Exclusive Distributors of

Snap-On Wrenches and Blue Point Tools

General Offices, 14 East Jackson Boulevard

CHICAGO, -:- ILLINOIS

MOTOR TOOL SPECIALTY CO.
14 East Jackson Boulevard, Chicago, Illinois
Gentlemen:
I am interested in buying the most for the money available for my school auto shop. Send your folders and catalog.
.....Have a salesman call.
Name.....
Position.....
School.....
City..... State.....

Handbook for
DRILLERS
When is a Hole Larger than the Drill?
For the answer to this question, refer to page 16 of the "Handbook for Drillers," a 48-page textbook on twist drills and drilling practice. You will find in the "Handbook," in addition, answers to dozens of other questions which enable machine shop instructors to teach the correct use of twist drills.
To help further a better knowledge of twist drills and how to use them properly, we are always glad to send copies of the "Handbook" to school directors and instructors in any reasonable quantities for class use.
A new edition of the "Handbook" is now ready.
The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON
SAN FRANCISCO

(Continued from Page 286)

cation. They must know the history and philosophy of their subject and continually keep abreast of advances made in the field of general education.

Vocational teachers, said Mr. Schweickhard, must prepare to assume their place in the teaching body and they must not lose the opportunity of getting as good an education as that possessed by teachers of other subjects. He cautioned the teachers of industrial arts not to teach day by day but rather to build up a fullsome outline in which the proper sequence is maintained; not to emphasize manipulative skills only but also to have informational content in the course which is being offered.

At the end of the program George C. Donson, Washington High School, Washington, Pa., was elected chairman of the manual-training section for next year. It will be his duty to set up the program for next year's round-table discussion.

The printing section which met at the same time, had two good subjects on the program: "Printing and Art Education" by E. E. Sheldon, the Lakeside Press, R. R. Donnelley & Sons, Chicago, and "The Making of a Halftone" by E. P. Drummond, Freeman-Gross Engraving Co., Minneapolis.

The vocational section unfortunately was not well attended and it is to be greatly deplored that because of this a wonderful opportunity was lost to hear Prof. Donald G. Paterson, of the University of Minnesota, on "Mechanical Ability Tests."

At the general session Tuesday evening, Mr. J. H. McCloskey, director of technical work, Lakewood Schools, Lakewood, Ohio, and president of the Western Arts Association, delivered his presidential address. At the same meeting Dr. M. E. Haggerty, dean of education, University of Minnesota, spoke on "Education and the New World." The present-day tendency is to increase production while labor is continually being replaced by machinery. The problem of training for the proper use of leisure is therefore assuming ever greater proportions. All education must be enriched with creative thinking. The tendency of industry to spoil nature's handwork, must be counteracted by art just as education must also exert itself in the direction of encouraging wiser city planning. Art appreciation must become the heritage of larger and larger numbers. The arts must be more and more enriched and teachers of these subjects must make themselves increasingly more capable of teaching.

At the general session on Wednesday morning, the subjects of "Art as a Factor in the Modern Curriculum" was discussed by Esther W. Wuest, director of art, Portland, Oregon, and "The Pressure of Modern Educational Teaching Requirements in Relation to Art Courses Leading to University Degrees" by William H. Varnum, in charge of courses in applied arts, University of Wisconsin.

The general session in the evening at the Institute of Art, was on "Applied Modernism" by Edward W. Mathews, The Academy of Fine Arts, Chicago, and "Adjusting Art Education to Modern Life Through Home Decoration, Dress, Industry, and Amusement" by Frank Alvah Parsons, President, New York School of Fine and Applied Arts. It was the latter who emphasized that the term "modern art" is a misnomer, as every age had its streak of modernism, and that what we term modern art were better called contemporary art.

The Friday morning sectional meeting which was a joint round table of manual training and vocational education, offered some very good things. In the absence of A. H. Edgerton, director of vocational guidance, University of Wisconsin, the subject of "Some Recent Findings in Pupil Adjustment and Guidance" was discussed by John F. Friese, assistant professor of industrial education, University of Wisconsin.

William E. Warner, associate professor industrial arts, Ohio

(Continued on Page 18a)

An "Oliver" No. 80 Variety Saw Bench in the plant of the Davis Birely Table Co., Shelbyville, Ind.

Accepted —by industry and by scores of schools throughout America

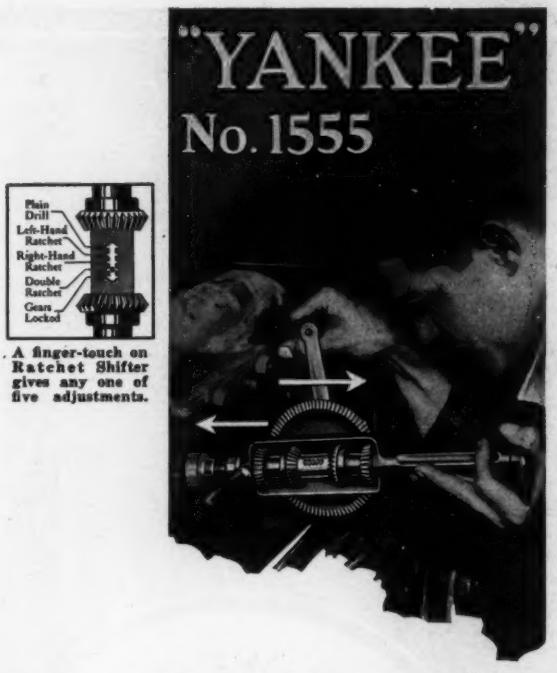
In voicing its approval of the "Oliver" No. 80 Variety Saw Bench, the Davis Birely Table Co., of Shelbyville, Ind., merely repeats what scores of other satisfied users have said. In this unanimous industrial approval can also be found the reason for the wide acceptance of this Variety Saw Bench by the school shops of America. School shops want tools most commonly found in industry. They are thus enabled to familiarize their pupils with the tools which they will encounter after leaving school. The Oliver No. 80 Variety Saw Bench will do ripping, cross-cutting and dadoing in an efficient manner. It will cut a perfect miter and will measure any angle instantly and accurately; it will cut off to length or rip to width—all without the operator having to do any previous calculating or even referring to a rule. It will pay you to investigate our complete line of wood working machinery before ordering any new equipment.

Write for catalog.

Oliver Machinery Company

Grand Rapids, Michigan, U.S.A.

HIGH GRADE MACHINERY



A finger-touch on Ratchet Shifter gives any one of five adjustments.

Handle *goes back* but drill *advances*

LACK of space in which to revolve crank does not matter, when using "Yankee" No. 1555. For with this breast drill, set on "Yankee" DOUBLE Ratchet, any back-and-forth movement of the crank, no matter how slight, drives the drill continuously.

The five ratchet adjustments shown above, and two speeds, make this "Yankee" Drill adaptable to the conditions surrounding any drilling job . . . the handiest and fastest breast drill ever designed.

With it the operator gets the "feel" of the work, controls it, and knows what his drill is doing all the time.

No. 1555. (illustrated) —Length, 17 in. 3-jaw chuck holds rounds up to ½ in. Double speed. Also, 2-jaw for square or round shanks. Price, $11.00.

No. 1545. Hand-Drill. Length, 16 in. 3-jaw chuck holds ⅝ in. Double Speed. Also, 2-jaw style. Price, $10.00.

No. 1530. Hand-Drill. Length, only 10½ in. Same ratchet adjustments as large drills. 3-jaw; ¼-in. Single speed. Price, $5.25.

Eighteen styles of "Yankee" Breast and Hand Drills, at prices from $3.00 up. All illustrated and described in the "Yankee" Tool Book offered below.

"YANKEE" TOOLS

MAKE BETTER MECHANICS

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

You may send "Yankee" Tool Book (offered in Industrial Arts) —Showing Spiral and Ratchet Screw-drivers, Automatic Push Drills, Ratchet Braces, Socket Bit-Extensions, Ratchet and Plain Breast and Hand Drills, Automatic Chain and Bench Drills, Ratchet Tap Wrenches, Continuous-Work Swivel Vises, Plain Screw-drivers, Etc.

(Please clip and write name and address in margin below)

(Continued from Page 16a)

State University, made a report of the progress made by the committee on terminology. He outlined the method in which the committee was making its study and showed what had been done toward clarifying the confusion which now exists in the terminology applied to industrial-arts and vocational-education work. He distributed a copy containing excerpts from the committee's investigation of professional and scientific terms, which occupied eleven pages of mimeographed material. This committee is to be commended for the stupendous task which they have undertaken and it is to be hoped that their findings will result in the adoption of a terminology which is more readily understood throughout the country.

Clyde A. Bowman, dean of the school of industrial education, Stout Institute, Menomonie, Wisconsin, very ably discussed the subject of "Interpreting Modern Demands Through Manual Arts Teacher-Training Programs." He showed the great necessity of giving the freshman who enters the teacher-training college every opportunity to make not one choice as to the course which he wants to pursue, but many choices; and that the courses offered to these young men must be flexible enough at all times to measure up to the continually shifting demands which our modern industrial age is imposing.

The printing section, Friday morning, had a number of interesting subjects on its program. Among them were "Printing Education in America" by Fred J. Hartman, director of education, United Typothetae of America; "Printing with Water-Color Inks" by A. L. Sutphin, Braden-Sutphin Company, Cleveland; and "All in a Day's Work" by Edwin L. Olson, Roosevelt High School, Minneapolis.

At a dinner meeting at six o'clock in the evening, the question of "Harmonizing Paper with Typography, Process and Purpose" was discussed by Arnett W. Leslie, The John Leslie Paper Co., Minneapolis.

The program was arranged so that a great many interesting and instructive tours to schools, museums, art institutes, and industrial establishments could be made. Nevertheless, many of those who were in attendance felt that if the program were to be a little more condensed, the attendance could be greatly increased because then the convention could be held on Thursday, Friday and Saturday of the week instead of occupying the greater part of the week, thus preventing many from attending, who could not afford or get permission to miss so much school time.

The following officers were elected for the next year:

President, Miss Lillian Weyl, director of art, Kansas City, Mo.; vice-president, Charles H. Bailey, head, department of arts and manual arts, Iowa State Teachers College, Cedar Falls, Iowa; secretary-treasurer, Harry E. Wood, director of industrial education, Indianapolis, Ind.; and auditor, Mrs. Lenore A. Eldred, director of art, Birmingham, Ala.

The next meeting of the association will be held at Louisville, Ky., on April 28, 29, 30, and May 1, 1931.

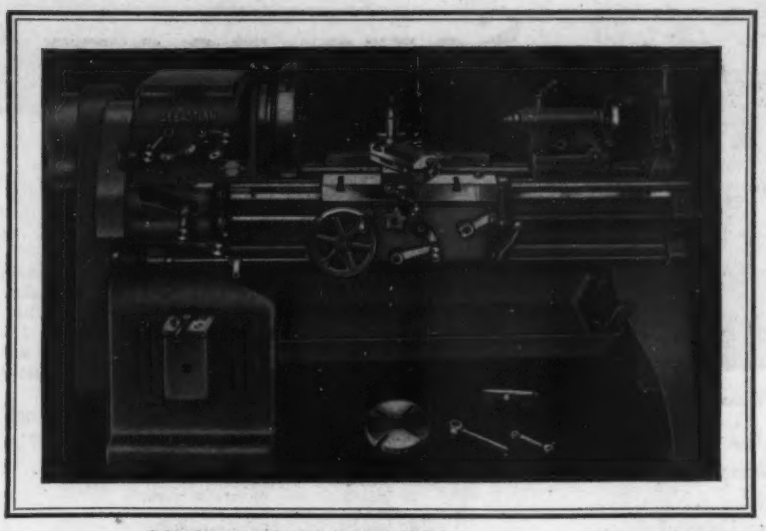
AMERICAN HOME-ECONOMICS ASSOCIATION CONVENTION

The twenty-third annual meeting of the American Home-Economics Association was held June 24 to 28, at Denver, Colorado.

At the first session on Tuesday evening, Dr. A. L. Threlkeld, superintendent of schools of Denver, Dean Margaret Justin of Kansas Agricultural College, and Miss Martha Van Rensselaer, of Cornell University, were the speakers. At the second meeting on Wednesday, Mr. John Nolen spoke on "Housing for the Modern Family"; and Dr. Dwight Sanderson, of Cornell, brought out some phases of the social significance of home and family life.

Special group meetings took care of the interests of the various divisions of the association, such as food nutrition, clothing and textiles, household equipment and management, institution economics, child development and parental edu-

(Continued on Page 21a)



Announcing the NEW 16″ Gold Seal (Timken Bearing) LATHE

"The Greatest Lathe Value Built"

Built to meet the needs of high speed, heavy duty industrial production, the ready adaptability of the 16″ Gold Seal Lathe to all kinds of work, together with its absolute safety to the operator, has made it the ideal lathe for the school shop. This machine combines the very latest features of modern lathe construction with a complete simplicity of operation that makes the student's work interesting, rather than a maze of complicated mechanism. Investigate this new machine NOW!

CONSTRUCTION FEATURES

Headstock shafts, including spindle, Timken equipped. Extra large hole through spindle.
Geared Head Lathes. Steel gears throughout.
Accuracy Alignment test .0005″.
Safety Shear Pin at end of Quick Change Box which practically eliminates all breakage.
Bronze Bushings used wherever conditions require.

Write for New Catalog

THE SEBASTIAN LATHE CO.
CINCINNATI, OHIO
444 Culvert Street
New York Office—Room 390—50 Church Street

(Continued from Page 18a)

cation, and the teaching of home economics in schools, colleges, and extension services.

NEW HAMPSHIRE SMITH-HUGHES TEACHERS HOLD CONFERENCE

The New Hampshire Smith-Hughes and Mechanic-Art Teachers held their ninth annual conference, April 24 to 26, at Dover. Mr. C. H. Dustin, supervisor of trades and industries, presided.

Mr. G. A. McGarvey, Federal Agent for Industrial Education, in his talk, outlined Achievements in Efficient Relationing of Shop and Related Work in Smith-Hughes and General Industrial-Arts Schools. Mr. Walter May spoke on the subject of Guidance in Trades and Industries; Mr. Clarence DeMar spoke on Printing; Mr. C. A. Adams talked on Books for the Shop Teacher's Library; and Mr. E. M. Martin discussed Automotive Electricity.

School Shop Equipment News

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

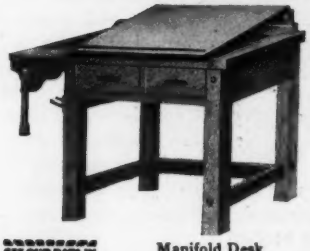
NEW YATES-AMERICAN PORTABLE BAND SAW

The Yates-American Machine Company, of Beloit, Wis., has announced the marketing of its new small 16-in. band saw, available as either portable or bench-type machine, known as Type Y-16.

The portable machine is mounted on a base with three casters, two fixed and one movable, which latter can be raised so that the base rests firmly upon the floor. When arranged as a portable machine, the Y-16 is a complete, well-proportioned, vibrationless unit. The upper wheel, which is aluminum, rotates on ball bearings and is provided with a tilting and straining device for tracking and placing the proper tension in the saw. Guards are furnished for protection when the machine is in operation. The table can be tilted to an angle of 45 degrees and clamped securely in place. Power is supplied by a ½-h.p. motor, which is furnished single- or three-phase, a.c. and d.c. The saw can be moved from shop to classroom and is capable of cutting stock 8 in. thick and 15 in.

(Continued on Page 22a)

An installation of 40 Kewaunee Desks



Manifold Desk
No. M-3025

SEE OUR DATA IN BRUCE'S SCHOOL SHOP ANNUAL 1930 EDITION

For Use in the following grades—

1. Platoon schools, or other forms of departmentalized programs. (Grades 2 or 3, to 6 or 8)
2. Non-departmentalized elementary school programs.
3. Kindergarten and Primary grades.
4. Junior High Schools. (Grades 7, 8 and 9)
5. Senior High Schools.
6. Teacher Training Schools.

Save room

with

Kewaunee MANIFOLD TABLES

Make manual training rooms available for art classes, industrial arts or craft classes, also general academic classes by equipping them with Kewaunee Manifold Tables. They turn the usual part-time manual training room into an all-day classroom. They provide more room for handling additional pupils in your present buildings and they eliminate duplicate teaching.

Kewaunee Manifold Tables are designed to be pedagogically correct for use with any of the following subjects—

1. fine arts work
2. mechanical drawing
3. industrial arts or crafts work, including light metal work
4. woodworking (manual training)
5. general academic work

Write for Kewaunee Book

The new Kewaunee Book fully explains the advantages of the Manifold Table, illustrates all models and pictures actual installations. Write for it. It is sent to teachers or school equipment buyers requesting the book on their institution's letterhead.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS
C. G. CAMPBELL, Pres. and Gen. Mgr.
245 LINCOLN ST. KEWAUNEE, WIS.
Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges
Factories at Kewaunee, Wis., and Adrian, Mich.

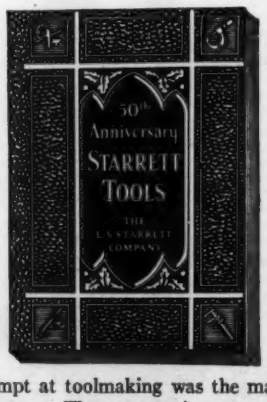
(Continued from Page 21a)

wide. The bench type may be used where the base and portable features are not required and in cases where there is an advantage in providing workmen with individual machines.

Complete information and prices may be obtained by any school-shop instructor upon request.

STARRETT COMPANY CELEBRATES GOLDEN ANNIVERSARY

The L. S. Starrett Company, of Athol, Mass., recently celebrated its golden anniversary. The firm was founded fifty years ago at Athol, by Mr. Laroy S. Starrett, a man who was possessed of a rare combination of inventive genius and business ability.

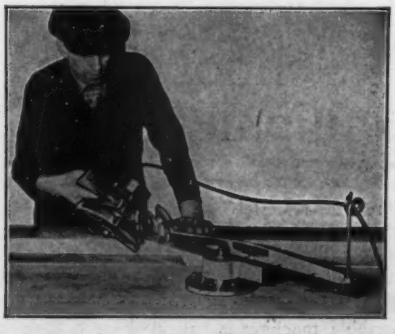


The first attempt at toolmaking was the making of a more convenient try-square. The new anniversary catalog, containing descriptions of over 2,500 items is a long step from the first Starrett combination square.

The Starrett Company today employs more than 700 skilled toolmakers and mechanics and manufactures more than 2,500 items. New tools are constantly added to keep pace with the ever-changing demands of modern industry. The Starrett tools have played an important part in the industries and have helped to make possible new standards of workmanship in the automobile industry and in the field of aviation. The firm has attained a record of honorable achievement in the furtherance and support of modern industrial achievement.

PORTER-CABLE TABLE ATTACHMENT FOR PORTABLE SAW

The Porter-Cable Machine Company, of Syracuse, N. Y., manufacturers of woodworking machinery, has just placed on the market a table attachment for effecting rapid changes in the speedmatic power saw from hand to table, and vice versa. The attachment has the advantage of increasing the all-around use of the tool, since it can be taken to the work, or can be used as a table saw, thus serving two different types of saws at the cost of one.



The table attachment which is made of cast-iron, is dovetailed and gibbed for hard wear to insure a lifetime of service, is light in weight, and can be attached to any table by means of three bolts. It can be used for a variety of operations, in-

(Continued on Page 25a)

From beginning to end, from top to bottom, you will find superiorities which in actual use mean dollars of savings to you.

If you expect the most for your money—you need SHELDON equipment.

Investigate, it will pay you well.

E. H. SHELDON & CO.
Muskegon, Mich.
Vocational Furniture Specialists.

Thousands of SHELDON Benches Ready for Immediate Shipment!

For more than a quarter of a century SHELDON has been manufacturing benches for the manual training departments of schools all over the country.

Much valuable experience in solving problems confronting this department has made it possible to manufacture benches which are far superior to the ordinary.

(Continued from Page 22a)

cluding ripping, fluting, stripping, depth cutting, and dadoing.

Complete information and prices may be obtained by any school-shop instructor upon request.

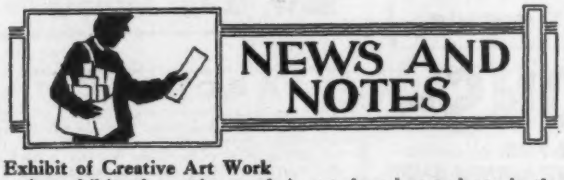


Exhibit of Creative Art Work

An exhibit of creative work in art done by students in the junior high schools of Baltimore was recently held in the Studio, Administration Building Annex. The exhibit which was the eighth in a series of nine exhibits, was arranged by Miss Lena Picker, supervisor of art in the junior high schools. It represented a display of work in hooked and braid-weave rugs, hand-loom weaving, pottery work, etching, blow and tie-dyeing, together with examples of work in sculpture, architecture, and commercial art.

Vocational Board Asks for Funds

With its right to use the Third Ward School for vocational work sustained by the supreme court, the Manitowoc, Wis., vocational board has asked the city council for funds to carry out the vocational project in the school. The board asked for $71,025, which is part of the fund which the council agreed to provide in case the court sustained the vocational board in its use of this school. The board will dispose of the property purchased several years ago as a site for the proposed vocational school.

Establish Vocational School

The board of directors of School Dist. No. 1 of Seattle, Wash., has voted to establish a vocational school and has made appropriations for extensions to present existing buildings and the purchase of additional land adjoining. It is planned to establish courses in auto mechanics, electricity, tailoring, beauty-parlor work, power-machine operation, and drafting. Other additional courses will be added as the need arises and accommodations are available. The school will be combined with the present continuation school and will be under the direction of Mr. A. E. Schoettler, formerly of Minneapolis, Minn.

Radio Talks on Vocations

The New York state education department, with the coöperation of the General Electric Company, has arranged with Station WGY for a series of weekly radio talks on the choosing of a vocation. These talks are given by outstanding leaders in a number of the professional vocations. It is expected that the talks will attract more attention to the subject in the junior and senior high schools. The program will be continued next year, with additional talks on other professions and on the major occupations in agriculture, finance, business, and industry.

Industrial-Art Courses at Stout Institute

A special course in aeronautics to meet the requirements of industrial-art teachers will be inaugurated during the 1930 summer session at Stout Institute, Menomonie, Wis. Special units of work will be offered in model building, involving construction and related subjects appropriate for junior-high-school students. The emphasis will be laid on the furnishing of assistance to teachers in the introduction of aeronautics work.

Course in Block Printing

A course in block printing was offered recently as an evening-school course at the high school at Tucson, Ariz. The course took up phases of the work applied to clothing and textiles and was intended to be of help to women desiring to learn something of the art of printing, clothing, and household appliances.

The School Shop Shopping Guide

TOOL CHECKS

STEEL MARKING DEVICES
—LETTERS AND FIGURES
RUBBER STAMPS
TYPE SETS AND PADS
CORPORATE SEALS

PALMER 8 HOUSE

Get these from one of industries' largest sources of supply.

SCHWAAB STAMP & SEAL CO.
DEPT. C
363 E. Water St.
Milwaukee, Wis.

BARBER-COLMAN

End Mills

USE "B-C" Quality Products always, for best results. These Small Tools are made well because they are made carefully—the service they give will show their inherent worth. End Mills are made in 7 different types and all standard sizes. Catalog G gives complete information and prices. Send for it today.

BARBER-COLMAN COMPANY
General Offices and Plant
Rockford, Ill., U. S. A.

WE SUPPLY

FREE

to instructors in auto mechanics at trade and manual training schools. Free samples for students. Write

Pep Mfg. Co., 33 W. 42 St., New York

ELECTRICAL INSTRUCTORS

ATTENTION !! ATTENTION !!

$1.79 Per Kit of Parts Operated by 2 Dry Cells

Wt. 2 lbs. With Pulley for Running Small Toys to Boys' Delight

Hundreds of these wonderful little projects have been sold to schools all over North America. Comes complete, all parts carefully machined—wire and job sheet, ready to assemble—can be readily placed in your course. Order sample, write for bulletin listing any projects—Red-I-Kut.

ELECTRICAL DEPARTMENT A
THE KUEMPEL COMPANY
Guttenberg, Iowa - - U. S. A.

Tools for the SCHOOL SHOP & supplies

Our complete hardware line assists in project completion & decoration

FREE CATALOG for instructors and supervisors only

"If it's from Gross it's good"
Gross Hardware
316-330 Third Street
Milwaukee, Wisconsin

BOWS AND ARROWS

Any wideawake youngster would rather make a bow than a breadboard. *Let him make something HE can use.*

L. E. STEMMLER CO.
Queens Village, New York

A complete line of raw materials and accessories at popular prices.
Write for FREE Catalog No. 10
BOW AND ARROW

CRAFTWORKERS' SUPPLIES

Tools, Sheet Metals, Jewelry Fittings, Snap Fasteners, Etc.

Catalog on request.

Buttonhead Rivets

LEWIS & CO.
P. O. Box 112 Watervliet, N. Y.

APRONS—

FOR THE MANVAL TRAINING SHOP

Protect clothes; save cleaner's bills; make classroom look business-like! Needed by students; approved by parents; standard equipment in training shops all over the country for years. Adjustable height, 28" x 35", white 60c, brown 65c.

INSTRUCTORS: You get one large Instructor's Apron FREE with order of 12 Student Aprons. ORDER NOW, remit after collection from students, or instruct us to charge to School Treasurer. Our "Money Back" guarantee protects wearer. Prepaid anywhere east of Denver.

Canvas Products Corp., Fond du Lac, Wis.

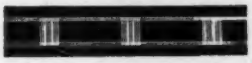
ARCHERY

Bargains for Bow and Arrow Makers.

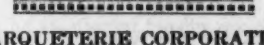
Port Orford cedar dowels with which the best and most durable flight arrows can be made. Will stand repeated shooting; three dozen 9/16 for $1.00. Bundle of 500, $13.50. Parallel points 35 cents the dozen. Aluminum arrow knocks 75 cents dozen. Bullet points 25 for 35 cents. Feathers $1.00 the pound. Yew Billets for joining $4.00 the pair.

Harry D. Hobson, Lyons, Oregon

OVERLAYS—BORDER STRIPES



Largest number of designs, largest stock for immediate delivery, and lowest prices of any firm in the world.



MARQUETERIE CORPORATION
1 PARK AVE. NEW YORK CITY
Ask for 1930 Catalog

Supplies and Projects for Home and Camp Crafts
Including:
Leatherwork, Beadwork, Basketry, Clay Modelling, Oil Painting, Linoleum Block Printing, Metalwork, Poster Card Painting, Wood Carving, Etc.
Write for Catalog
NATIONAL CRAFTS SUPPLY CO.
94 Lexington Ave. New York, N. Y.

ELECTRO-TYPERS

Especially qualified to be of service to the school printshop.

Promptness and quality assured.

Forms returned same day received.

Badger Electrotype Co.
600 Montgomery Bldg.
129 E. Michigan St., Milwaukee, Wis.